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THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

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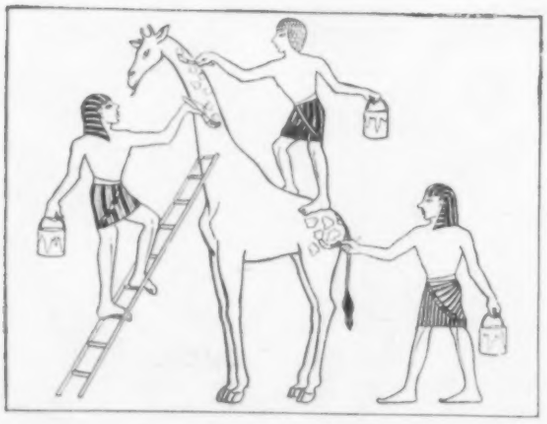
EGYPTIAN



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THE
METAL INDUSTRY
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THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

VOL. 22 NEW YORK, OCTOBER, 1924 No. 10

Milwaukee the Convention City

The 1924 Meeting of the American Foundrymen's Association and the Institute of Metals Division, A.I.M.E., in Milwaukee, Wis., October 11-16, 1924

Written for The Metal Industry by R. L. FOLEY, Milwaukee, Wis.

Milwaukee, called the Pittsburgh of the Middle West because of its mammoth steel industries and diversity of manufacturing enterprises, a city that is famous for its foundries and shops, as well as its residences and gardens, will be host to thousands of American and foreign foundrymen and men of industry from October 11 to 16 inclusive.

HOTEL PFISTER, MILWAUKEE, WIS.
Convention Headquarters

METAL INDUSTRIES OF MILWAUKEE

Milwaukee is one of the greatest machinery manufacturing centers in the world, the second largest steel center, the second largest producer of malleable iron in the United States, famous for the variety of its metal trades. The growth of its metal trades for three years is as follows:

1921	1922	1923
$171,778,765	$214,166,835	$277,131,416

The industrial output of Milwaukee in 1923 exceeded that of 1922 by 22.9 per cent according to the figures as reported by various manufacturing firms of the country. The increase was general and covered practically all lines of activity. In some cases the increases seem paradoxical, but in most instances they are in line with what was to be expected in a period of normal, healthy growth.

In THE METAL INDUSTRY for September, 1918, a report was published of Milwaukee, in that year also the location of the Convention of the American Foundrymen's Association, showing total manufactures amounting to about $108,000,000. A comparison of this total with those above shows clearly the growth of this city. Moreover, the list of sixteen important companies consuming and working metals, as published in September, 1918, has grown to the thirty-eight listed below.

Brass foundries in the Milwaukee district are consuming on an average of 140,000 pounds of metal per day, the lead pipe factories do a business of $3,000,000 yearly, the Windsor Lead Company and the Crown Metal Company being among the largest in that division. White metals and kindred lines to the value of $10,000,000 are consumed yearly.

Approximately 3,000 men are engaged solely in the production of metal products (outside of iron and steel) in the district, and their yearly wage is in excess of a million and a half dollars.

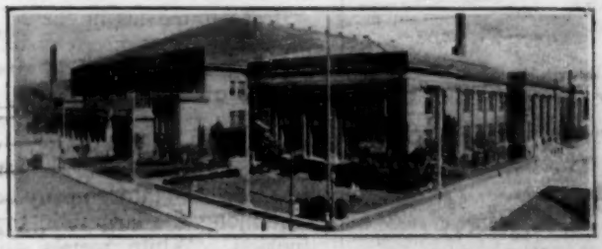
With European conditions more settled and greater confidence in politics, a greater improvement in the metal branches is reported. This improvement has been very marked in the Milwaukee factories in the last three months.

Some of the large consumers of metals located in the Milwaukee district, many of which will exhibit at the convention, include:

Allis-Chalmers Company.
American Metal Products Company.
Chain-Belt Company.
Claus Automatic Gas Cook Company.
Evinrude Motor Company.
Falk Corporation.
Filer & Stowell Company.
B. Hoffmann Manufacturing Company.
International Harvester Company.
Johnson Service Company.
Kakel Brothers.
Otto Kramer Company.
Lamp & Miller Manufacturing Company.
Lindemann & Hoverson Company.

Magnus Company, Inc.
Manufacturers' Foundry.
Badger Metal Company.
Milwaukee Aluminum & Brass Foundry.
Milwaukee Brass Manufacturing Company.
Milwaukee Bronze Casting Company.
Milwaukee Die Casting Company.
Milwaukee Flush Valve Company.
Milwaukee Valve Company.
Pawling & Harnischfeger Company.
Polachek & Brothers Company.
Henry A. Poppert & Son Company.
Prime Manufacturing Company.
Production Pattern and Equipment Company.
Reo Manufacturing Company.
Richardson-Phoenix Company.
Roberts Manufacturing Company.
Rundle Manufacturing Company.
Standard Brass & Iron Works.
Starcast Aluminum Company.
Stroh Die Casting Company.
Superior Foundries, Inc.
Vilter Manufacturing Company.
Wisconsin Iron & Wire Works.

The Quality Aluminum Casting Company, the Waukesha Foundry Company, and the Werra Aluminum Foundry Company, located at Waukesha, some fifteen miles west of Milwaukee, all have greatly increased their consumption of metals in the last year. The Werra Aluminum Foundry Company does a business in excess of $7,000,000 yearly.



MILWAUKEE AUDITORIUM

The order of importance of the eight principal industrial groups in the Milwaukee district remains substantially the same; metal trades continue to lead. The increase in the value of metal products of 1923 over 1922 was 29 per cent. Wages and salaries paid were 42.2 per cent more in 1923 than in 1922, capital employed, 12.2 per cent more and export business of the metal trades, 39 per cent greater in 1923 than in the preceding year.

Present indications make it appear that the 1924 volume of business for the metal trades will make another record.

From these figures the importance of the metal trades to the life and prosperity of the community can be realized, constituting as they do the largest of the various local lines. They have been the most important factor in bringing Milwaukee to the high position it occupies today as one of the leading manufacturing cities in the country.

PROGRAM AND EXHIBIT

Both the exhibit and convention will be held in the municipal auditorium of Milwaukee, which is said to be without peer of its kind in the country. Reports of plans of exhibitors give promise of the "best" exhibit that the A. F. A. ever held.

The Institute of Metals Division of the A. I. M. E., as usual, will meet in joint convention with the association. Every indication points to a most important program. Among the exhibits will be many unusual features, including a complete exhibit of foundry equipments, particularly electric, and the Pittsburgh Electric Furnace Corporation will install and operate an electric furnace.

An innovation, too, will be the awarding of three solid gold castings of a foundryman, specially designed by an artist of distinction, for the outstanding paper read at the convention, for the outstanding achievement in foundry work and for any other outstanding purpose to be decided upon by the awards committee.

Apprenticeship training, which has come to be such an important part of modern industry, will be strongly emphasized at the convention. This will be especially appropriate at Milwaukee as that city boasts the most progressive organized apprenticeship training that is being undertaken in any American city. Those foundrymen who have voiced complaint that young men of the right calibre cannot be induced to go into the trades will have opportunity to observe how apprentice training is being successfully carried out by plants which have waiting lists of the right kind of boys anxious to learn the foundry trade.

During the convention the Falk Corporation will move its apprentice office to the convention hall and conduct there all the activities of this department for the benefit of attending foundrymen. This will consist of interviewing apprentices and of carrying on shop control through the master control and departmental boards. In addition there will be on display forms and records used in carrying on this week.

The testing of foundry sand samples being carried on by the joint committee on Molding Sand Research has been practically completed, and data obtained will be ready for presentation in report form at the convention. These sand samples comprise those collected by ten different state geological surveys with a total number of samples of 613. The complete report will make available to foundrymen a comprehensive survey of the properties and qualities of foundry sands which are found located in most of the foundry sand producing states.

Any organization that can produce a technical program and an exhibition of equipment such as will be shown at the Milwaukee convention, combined with a drawing

G. H. CLAMER, RETIRING PRESIDENT

power of thousands of participants, has come to a position of leadership. Few societies attempt a program with exhibits on such a large scale in addition to a program of papers so varied and comprehensive as will be read.

COMMITTEES.

Among the committees are:

Papers: E. F. Cone, chairman, Iron Age, New York City; Robert E. Kennedy, secretary, Urbana, Ill.

Convention and Exhibits: G. H. Clamer, chairman, Ajax Metal Company, Philadelphia, Pa.

Awards: C. R. Messinger, chairman, Milwaukee, Wis.

Nominating: C. S. Koch chairman, McKeesport, Pa.

Foundry Costs: W B. Greenless, chairman, Chicago.

Industrial Education and Training of Apprentices: C. B. Connelly, chairman, Carnegie Institute, Pittsburgh, Pa.; R. E. Kennedy, secretary, Urbana, Ill.

Standard Pattern Practices: Edwin S. Carman, M.E., chairman, Cleveland, Ohio.

Joint Committee on Molding Sand Research of American Foundrymen's Association and National Research Council: Walter M. Saunders, chairman, Providence, R. I.

L. W. OLSON
Nominated for President

Corrosion of Metals: H. Y. Carson, chairman, American Cast Iron Pipe & Foundry Company, Birmingham, Ala.

Non-Ferrous Castings: Jesse L. Jones, chairman, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Refractories: C. N. Ring, chairman, Allied Steel Casting Company, Chicago.

Coal and Coke: R. S MacPherran, chairman, Allis-Chalmers Manufacturing Company, West Allis, Wis.

Metallography: H. A. Schwartz, chairman, National Malleable & Steel Castings Co., Cleveland, Ohio.

AMERICAN FOUNDRYMEN ASSOCIATION REPRESENTATIVES ON SUB-COMMITTEES OF AMERICAN SOCIETY FOR TESTING MATERIALS COMMITTEE A-3

General Castings: R. S. MacPherran, Allis-Chalmers Manufacturing Company, West Allis, Wis., and H. B. Swan, Cadillac Motor Car Co., Detroit, Mich.

Pure Metals in Ingot Form: G. H. Clamer, Ajax Metal Company, Philadelphia.

WORK OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION.

A word about the birth and growth of the American Foundrymen's Association may not be amiss at this time. In 1896 a small graup of foundrymen, realizing the tremendous growth that lay ahead of their industry, and recognizing the vast benefits that might be gained from an organization which (from a non-profit viewpoint) would foster a closer relationship between foundrymen, called a meeting of active foundrymen at Philadelphia on June 12.

Those who attended the meeting endorsed the principle of an association of foundrymen to act for the industry:

1. In conducting research activities which were too extensive or too costly for any except the largest organizations to conduct independently.
2. As a clearing house for foundry information and the advanced ideas of practical foundrymen.
3. As a proper representative in matters of industrial relations affecting the industry.
4. As a sponsor of foundrymen's conventions and exhibits and of other meetings of foundrymen having the betterment of the industry as an objective.

After defining these broad principles of operation for an association, officers for a temporary organization were appointed, and the American Foundrymen's Association began to function.

Since the first meeting it has gone steadily forward, increasing its membership, which now includes most of the recognized authorities on foundry practice and management; broadening the scope of its activities and increasing its worth to the industry which it serves until it has not only become an invaluable factor in the manufacture of better castings, but it also occupies a place among technical associations which is unique.

REPORT OF NOMINATING COMMITTEE.

On July 7, 1924, the Nominating Committee forwarded its report to all the members of the association, nominating the following officers and directors:

For **president** to serve for one year: **L. W. Olson,** works manager, Ohio Brass Company, Mansfield, Ohio.

For **vice-president** to serve for one year: **A. B. Root, Jr.,** mechanical engineer, Hunt-Spiller Manufacturing Corporation, Boston, Mass.

For **director** to serve for one year: **V. E. Minich,** president, American Foundry Equipment Company, New York City.

For **directors** to serve three year terms each: **G. H. Clamer,** vice-president, Ajax Metal Company, Philadelphia, Pa.; **John E. Galvin,** president, Ohio Steel Foundry Company, Lima, Ohio; **A. E. Hageboeck,** secretary, Frank Foundries Corp., Moline, Ill.; **R. A. Nourse,** vice-president and general manager, Stowell Company, South Milwaukee, Wis.; **Wm. J. Nugent,** vice-president and general manager, Nugent Steel Casting Company, Chicago.

TECHNICAL PROGRAM FOR THE MILWAUKEE MEETING.

Monday, October 13.

P. M.—Session No. 1 (Joint session with Institute of Metals Division A.I.M.E.)

C. E. HOYT
Secretary

(1) Making Copper Castings from Cupola Melted Metals, by T. F. Jennings, Garfield, Utah.

(2) Modern Bell Founding, by Wesley Lambert and G. Hall, London, England. Annual Institute of British Foundrymen Exchange Paper.

(3) Art Bronze Work, by J. F. Arnold, Mt. Vernon, N. Y.

(4) Recuperation in Connection with Brass Melt-

ing, by H. D. Savage, Combustion Engineering Corporation, New York.

(5) Report of Committee on Non-Ferrous Metals.

(6) Founding of Brass in Mexico, by H. H. Miller, Torreon, Coa, Mexico.

Tuesday, October 14.

A. M.—Session No. 3 (Aluminum and Aluminum Alloys, Joint Session with the Institute of Metals Division A. I. M. E.).

(1) Production of Aluminum Alloy Piston in Permanent Molds, by R. J. Anderson, Consulting Metallurgical Engineer, Boston, Mass., and M. E. Boyd, Clinton, Michigan.

(2) Aluminum-Silicon Alloys, by D. Basch, General Electric Co., Schenectady, N. Y.

(3) Aluminum Alloy Castings from Sheet Scrap, by H. C. Knerr, Philadelphia, Pa.

(4) Salvage of Aluminum Alloy Castings by Welding and Soldering, by R. J. Anderson, Boston, Mass., and M. S. Boyd, Detroit, Mich.

(5) Alpax, a New Development of Alloy Alloys, by Dr. L. Guillet, France.

Tuesday, October 14.

P. M.—Session No. 6 (Sand Research).

(1) Report of Chairman of Joint Committee on Molding Sand Research.

(2) Report of Chairman of Sub-Committee on Tests of Joint Committee on Molding Sand Research.

(3) Development and Comparison of Permeability Testing Apparatus, by T. C. Adams, Cornell University, Ithaca, N. Y.

(4) Relation of Water to Bond and Permeability, by C. R. Nevin, Cornell University, Ithaca, N. Y.

(5) Method for Direct Reading of Permeability of Sands, by A. A. Grubb, Ohio Brass Company, Mansfield, Ohio.

(6) Sand Control Testing in the Foundry, by H. W. Dietert, U. S. Radiator Corp., Detroit, Mich.

(7) A Study of the Effect of Heat on the Clay Content of Molding Sands, as Shown by the Dye Absorption Test, by Messrs. Harrington, MacComb and Hosmer, The Hunt-Spiller Manufacturing Company, Boston, Mass.

Tuesday, October 14.

P. M.—Session No. 7 (Special Session of the Institute of Metals Division of the A. I. M. E.).

(1) Casting and Heat Treatment of Some Aluminum-Copper Magnesium Alloys, by Samuel Daniels, A. J. Lyon and J. B. Johnson.

(2) Experiments on the Heat Treatment of Alpha-Beta Brass, by G. W. Ellis and D. A. Schemnitz.

(3) Coating Formed on Corroded Metals and Alloys, by George M. Enos and Robert J. Anderson.

(4) Notes on Hardness of Heat-Treated Aluminum Bronze, by George F. Comstock.

Wednesday, October 15.

P. M.—Session No. 8 (Sand Research).

(1) Report of Sub-Committee on Geological Surveys.

(2) Report of Sub-Committee on Conservation and Reclamation.

(3) Notes on the Grading of Sands, by C. R. Nevin, Cornell University, Ithaca, N. Y.

(4) An Exhaustive Study of Various Molding Sand Mixtures, Together with the Physical Properties of the Molds and Castings Produced, by Messrs. Harrington, Wright and Hosmer, Hunt-Spiller Mfg. Corp., Boston, Mass.

(5) The Effect of Moisture, Silt and Clay Content on Various Molding Sand Mixtures, by Messrs. Harrington, Wright and Hosmer, Hunt-Spiller Manufacturing Corporation, Boston, Mass.

Wednesday, October 15.

P. M.—Session No. 10 (Business Session).

Report of Officers.

Presentation of Major Awards.

A World Outlook for American Foundrymen, by H. Cole Estep, Cleveland, Ohio.

Wednesday, October 15.

P. M.—Session No. 11 (Industrial Relations).

Wednesday, October 15.

7:00 P. M.—Annual Banquet.

ATTENDANCE AT CONVENTION

The Secretary's office is frequently asked for information as to the total attendance at the annual conventions and the representation from different sections of the country. Below is a table showing the number registered from each state, Canada and foreign countries at the last seven conventions, 1916 to 1923, inclusive. This is the registered attendance only and does not include ladies in attendance or local representatives of the industry who do not have some official title. It is estimated that 30 per cent of those who attend the conventions do not register.

	CLEVELAND	BOSTON	MILWAUKEE	PHILADELPHIA	COLUMBUS	ROCHESTER	CLEVELAND
	1916	1917	1918	1919	1920	1922	1923
Alabama	8	6	13	13	23	6	7
Arkansas	1						
California	2	2	10	8	12	10	5
Colorado			4		1		
Connecticut	39	147	11	115	43	40	54
Delaware	2	6	2	18	2	3	1
Dis. of Col.	2	7	3	13	2	3	1
Florida					2		1
Georgia	3	5	5	12	11	1	3
Illinois	212	128	535	189	426	212	360
Indiana	98	25	111	50	250	56	128
Iowa	18	3	44	23	50	10	32
Kansas	7	4	6	8	7	3	9
Kentucky	5	4	4	6	22	5	6
Louisiana		1					2
Maine	1	7	1	4		3	3
Maryland	16	23	15	57	50	27	47
Massachu'ts	48	474	17	92	65	90	78
Michigan	203	81	226	146	331	177	264
Minnesota	13	8	62	10	24	4	10
Mississippi		1		3			3
Missouri	22	11	29	26	53	10	25
Montana	2		1				1
Nebraska	2		1		3	1	
New Hamp.	3	17	1	1	4	3	4
New Jersey	32	93	27	173	81	78	58
New Mexico							1
New York	252	347	185	455	440	758	447
N. Carolina	1	2	1	5	4	3	
Ohio	912	174	319	388	1282	347	1154
Oklahoma	3	1		1	4		3
Oregon	1	1	2	8	1		
Pennsylvania	390	236	130	815	359	395	487
Rhode Island	14	86	2	23	8	13	14
S. Dakota	1			1	2		1
Tennessee	9	3	15	16	27	12	15
Texas	4	2	3	5	14	4	4
Utah		1	1	1		1	1
Vermont		14	2	9	8	8	4
Virginia	2	3	7	20	18	5	12
Washington	1	2	7	3	3	1	2
W. Virginia	4	2	5	10	19	9	12
Wisconsin	75	32	461	50	128	49	91
Canada	63	78	84	80	100	117	88
Foreign	3	7	4	18	14	6	5
Total	2474	2044	2357	2872	3897	2470	3435

LIST OF EXHIBITORS

Adams Company, Dubuque, Ia.
Advance Milling Company, Chicago, Ill.
Air Reduction Sales Company, New York City.
Ajax Metal Company, Philadelphia, Pa.
Albany Sand & Supply Company, Albany, N. Y.
Alloys & Products, Inc., New York City.
American Foundry Equipment Company, New York City.
American Metal Market Company, New York City.
American Vent Wax Company, Lockport, N. Y.
Ames Shovel & Tool Company, Boston, Mass.
Arcade Manufacturing Company, Freeport, Ill.
Armstrong-Blum Manufacturing Company, Chicago, Ill.
Asbury Graphite Mills, Asbury, N. J.
E. C. Atkins & Co., Indianapolis, Ind.
Austin Company, Cleveland, Ohio.

Bacharach Industrial Instrument Company, Pittsburgh, Pa.
Baker R. & L. Company, Cleveland, Ohio.
Barrett Cravens Company, Chicago, Ill.
C. O. Bartlett & Snow Company, Cleveland, Ohio.
H. L. Baumgardner Corporation, Chicago, Ill.
Beardsley & Piper Company, Chicago, Ill.
Berkshire Manufacturing Company, Cleveland, Ohio.
Chas. H. Besly & Co., Chicago, Ill.
Bethlehem Steel Company, Inc., Bethlehem, Pa.
S. Birkenstein & Sons, Inc., Chicago, Ill.
Black Diamond Saw & Machine Works, Natick, Mass.
Blystone Manufacturing Company, Cambridge Springs, Pa.
Alfred Box & Co., Philadelphia, Pa.
Bradley Washfountain Company, Milwaukee, Wis.
Brass World Publishing Company, New York City.
Bridgeport Safety Emery Wheel Company, Bridgeport, Conn.
Buckeye Products Company, Cincinnati, Ohio.
Burdett Manufacturing Company, Chicago, Ill.

Carborundum Company, Niagara Falls, N. Y.
Carpenter Bros., Milwaukee, Wis.
Carter Bloxonend Flooring Company, Kansas City, Mo.
Frank D. Chase, Inc., Chicago, Ill.
Chicago Crucible Company, Chicago, Ill.
Chicago Pneumatic Tool Company, New York City.
Chisholm-Moore Manufacturing Company, Cleveland, Ohio.
Clark Tructractor Company, Buchanan, Mich.
Cleveland Pneumatic Tool Company, Cleveland, Ohio.
Clipper Belt Lacer Company, Grand Rapids, Mich.
F. A. Coleman Company, Cleveland, Ohio.
Corn Products Refining Company, New York City.

Davenport Machine & Foundry Company, Davenport, Ia.
William Demmler & Bros., Kewanee, Ill.
Detroit Electric Furnace Company, Detroit, Mich.
Detroit Electric Welding Company, Detroit, Mich.
Dings Magnetic Separator Company, Milwaukee, Wis.
Henry Disston & Sons, Philadelphia, Pa.
Joseph Dixon Crucible Company, Jersey City, N. J.
Dock & Mill Company, North Tonawanda, N. Y.

Electric Furnace Company, Salem, Ohio.
Electric Heating Apparatus Company, Newark, N. J.
Electro Refractories Corporation, Buffalo, N. Y.
Elwell-Parker Electric Company, Chicago, Ill.
E. L. Essley Machinery Company, Chicago, Ill.
Euclid Crane & Hoist Company, Euclid, Ohio.

Fanner Manufacturing Company, Cleveland, Ohio.
Federal Foundry Supply Company, Cleveland, Ohio.
Federal Malleable Company, West Allis, Wis.
Foundry Equipment Company, Cleveland, Ohio.

J. H. Gautier & Co., Jersey City, N. J.
General Electric Company, Schenectady, N. Y.
Globe Steel Abrasive Company, Mansfield, Ohio.
Great Western Manufacturing Company, Leavenworth, Kans.
Grimes Molding Machine Company, Detroit, Mich.

R. G. Haskins Company, Chicago, Ill.
Hauck Manufacturing Company, Brooklyn, N. Y.
Hayward Company, New York City.
Herman Pneumatic Machine Company, Pittsburgh, Pa.
Hill & Griffith Company, Cincinnati, Ohio.
Hillside Fluor Spar Mines, Chicago, Ill.
Holcroft & Co., Detroit, Mich.

Illinois Clay Products Company, Joliet, Ill.
Independent Pneumatic Tool Company, Chicago, Ill.
Ingersoll-Rand Company, New York City.
International Molding Machine Company, Chicago, Ill.
Interstate Sand Company, Zanesville, Ohio.
Iron Age, New York City.

Johnston & Jennings Company, Cleveland, Ohio.

Charles C. Kawin Company, Chicago, Ill.
Wm. H. Keller, Inc., Grand Haven, Mich.
Keller Machanical Engineering Corporation, Brooklyn, N. Y.
Spencer Kellogg & Sons, Inc., Buffalo, N. Y.
Kindt-Collins Company, Cleveland, Ohio.
King Refractories Company, Inc., Buffalo, N. Y.
Knefler, Bates Manufacturing Company, Indianapolis, Ind.
Chas. A. Krause Milling Company, Milwaukee, Wis.

Lakewood Engineering Company, Cleveland, Ohio.
H. M. Lane Company, Detroit, Mich.
Lava Crucible Company, Pittsburgh, Pa.
Leeds & Northrup Company, Chicago, Ill.
Lewis-Shepard Company, South Boston, Mass.
Lindsay-McMillan Company, Milwaukee, Wis.
Link-Belt Company, Chicago, Ill.
Louden Machinery Company, Fairfield, Ia.

C. E. McArthur & Co., Chicago, Ill.
J. S. McCormick Company, Pittsburgh, Pa.
MacLean Publishing Company, Toronto, Ont.
Macleod Company, Cincinnati, Ohio.
Magnetic Manufacturing Company, Milwaukee, Wis.
Malleable Iron Fittings Company, Branford, Conn.
Marschke Manufacturing Company, Indianapolis, Ind.
Mathews Conveyor Company, Ellwood City, Pa.
Mercury Manufacturing Company, Chicago, Ill.
Metal Industry, New York City.
Metal & Thermit Corporation, New York City.
Michigan Smelting & Refining Company, Detroit, Mich.
Milwaukee Chaplet Company, Milwaukee, Wis.
Milwaukee Electric Crane & Mfg. Company, Milwaukee, Wis.
Milwaukee Foundry Equipment Company, Milwaukee, Wis.
Moline Iron Works, Moline, Ill.
Monarch Engineering & Manufacturing Company, Baltimore, Md.

National Engineering Company, Chicago, Ill.
New Haven Sand Blast Company, New Haven, Conn.
Wm. H. Nicholls Company, Brooklyn, N. Y.
Norma Company of America, Long Island City, N. Y.
Northern Blower Company, Cleveland, Ohio.
Norton Company, Worcester, Mass.

S. Obermayer Company, Chicago, Ill.
Oilless Core Binder Company, Cleveland, Ohio.
George Oldham & Son Company, Baltimore, Md.
Oliver Machinery Company, Grand Rapids, Mich.
Osborn Manufacturing Company, Cleveland, Ohio.
Oxwell Acetylene Company, New York City.

Pangborn Corporation, Hagerstown, Md.
Patent Cereals Company, Geneva, N. Y.
Pawling & Harnischfeger Company, Milwaukee, Wis.
J. W. Paxson Company, Philadelphia, Pa.
Penton Publishing Company, Cleveland, Ohio.
Peterson Core Oil & Manufacturing Company, Chicago, Ill.
Pickands, Brown & Co., Chicago, Ill.
W. H. Pipkorn Company, Milwaukee, Wis.
Pittsburgh Electric Furnace Company, Pittsburgh, Pa.
Porcelain Enamel & Manufacturing Company, Baltimore, Md.
Portage Silica Company, Youngstown, Ohio.
Henry E. Pridmore, Chicago, Ill.

Quigley Furnace Specialties Company, New York City.

Racine Tool & Machine Company, Racine, Wis.
Reading Chain & Block Corporation, Reading, Pa.
Republic Carbon Company, Milwaukee, Wis.
Richards Wilcox Manufacturing Company, Aurora, Ill.
Robeson Process Company, New York City.
Rogers, Brown & Co., Cincinnati, Ohio.
P. H. & F. M. Roots Company, Connersville, Ind.
Ross-Tacony Crucible Company, Tacony, Philadelphia, Pa.
Royer Foundry & Machine Company, Wilkes-Barre, Pa.
Ruemelin Manufacturing Company, Minneapolis, Minn.

Safety Equipment Service Company, Cleveland, Ohio.
Safety First Shoe Company, Boston, Mass.
Shepard Electric Crane & Hoist Company, Montour Falls, N. Y.
Skeppstedt-Erickson Company, Moline, Ill.
Skybryte Company, Cleveland, Ohio.
W. W. Sly Manufacturing Company, Cleveland, Ohio.
Smith Oil & Refining Company, Rockford, Ill.
Werner G. Smith Company, Cleveland, Ohio.
Spencer Turbine Company, Hartford, Conn.
Standard Horse Nail Company, New Brighton, Pa.
Standard Radial Blast Corporation, New York City.
Steel Products Manufacturing Company, Cicero, Ill.
Sterling Wheelbarrow Company, Milwaukee, Wis.
Frederic B. Stevens, Inc., Detroit, Mich.
Stoney Foundry Engineering & Equipment Company, Cleveland, O.
N. A. Strand & Co., Chicago, Ill.
Sullivan Machinery Company, Chicago, Ill.
Swartwout Company, Cleveland, Ohio.
Wm. Swindell & Brothers, Pittsburgh, Pa.

Tabor Manufacturing Company, Philadelphia, Pa.
Thomas Elevator Company, Chicago, Ill.
Truscon Steel Company, Youngstown, Ohio.

United Compound Company, Buffalo, N. Y.
United States Graphite Company, Saginaw, Mich.
United States Silica Company, Chicago, Ill.

Vibrating Machinery Company, Chicago, Ill.

Waldo, Egbert & McClain, Inc., Buffalo, N. Y.
J. D. Wallace & Co., Chicago, Ill.
Warner & Swasey Company, Cleveland, Ohio.
Watson Engineering Company, New York City.
Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.
Westinghouse Traction Brake Company, Chicago, Ill.
Whiting Corporation, Harvey, Ill.
G. H. Williams Company, Erie, Pa.
E. J. Woodison Company, Detroit, Mich.

Yale & Towne Manufacturing Company, Stamford, Conn.
Young Bros. Company, Detroit, Mich.

Permalloy*

The announcement was recently made of a new alloy, called permalloy, which has such remarkable magnetic properties that its use in the manufacture of submarine cables will permit messages to be transmitted at speeds many times that now obtainable, and that is only one of the many applications that this new alloy is sure to find. An old message bearer, the cable, with advantages of control and privacy, has been given "new wind" in the race with its young rival in service to mankind, "wireless." Permalloy did not just happen; it is one of many results of modern, methodical, planned research. To be sure, there was pleasant surprise when test after test revealed and proved its remarkable properties.

Permalloy is an alloy of nickel and iron which is characterized by extremely high magnetic permeability at low magnetizing forces. Its extraordinary "magnetic permeability" means the ease with which magnetic "lines of force" penetrate it and make of it an electro-magnet. It is far the most easily magnetized and demagnetized of all metals now known. The particular composition which is best in this regard contains about 80 per cent nickel and 20 per cent iron. The mere mixture of the two metals is, however, not sufficient to secure the highest permeability. A special heat treatment is also required. When properly heat treated its initial permeability is more than thirty times that of soft iron.

Another interesting property of nickel-iron alloys of about this composition is extreme sensitiveness of magnetic properties to mechanical strain. So far as has been determined, however, it is only in connection with its magnetic properties that permalloy is unusual. The X-ray study of these alloys reveals that their crystal structure is like that of nickel. Permalloy can easily be cast in ingots, reduced to billets, drawn into rods and wire, and rolled to thin tape.

Nickel-iron alloys containing more than 30 per cent nickel and having the arrangement of their crystals characteristic of nickel, possess remarkable magnetic properties. The series of alloys shows no mechanical, physical or electrical abnormalities and these qualities are little affected by heat treatment, which so profoundly affects the magnetic properties.—RESEARCH NARRATIVES.

* Based on information supplied by H. D. Arnold, Ph.D., and G. W. Elmen, M.A., of the Research Laboratories of the American Telephone and Telegraph Company and the Western Electric Co., Inc.

Punching Lead Washers or Gaskets

Q.—As we have been using fiber washers on our corporation stops and our customers are specifying lead washers in these goods we have decided to adopt the lead gaskets on all sizes and styles of corporation stops and abandon the use of the fiber gasket. We have, however, had difficulty in punching these lead washers owing to the nature of the metal. At first we used a double punch with a spring ejector, but found this was unsatisfactory and finally had to do the job in two operations, namely, blanking them and then punching the center hole. As we manufacture these in the smaller sizes in 100,000 lots, using sheet lead 1/16 inches thick and 1 1/16 inches diameter with ¾ hole, we would be glad to know of suitable tools for this work.

A.—A standard press fitted with a double roll-feed would be the most suitable for this work and can be readily changed over for various sizes. The dies should be of the progressive type, piercing at the first stroke, and blanking out the first piece at the second stroke while the second piece is being pierced. If it is essential that the washers be exactly concentric, the blanking punch should be fitted with a pilot to enter the pierced hole.

When this is done the top feed rolls are lifted slightly as the pilot enters the stock, so that the pilot can move the stock either backward or forward into the correct position for making a concentric piece. With this type of tool, the piercings and blanks are pushed through the die and the material is not spread so much as when spring ejectors are used.

Several pairs of punches, with their corresponding dies, may be fitted according to the quantity of the washers of each size required to each one. The press should run at from 70 to 150 strokes per minute, according to the number of blanks and the feed required by the rolls. Thus, with five pairs of punches, and the press running at 100 strokes per minute, the output would be 500 per minute.—P. W. BLAIR.

What is a Brass Moulder?

The Need for Standardizing Methods of Judging Foundry Workers; Also a Tabulated Trade Specification Sheet

Written for The Metal Industry by MERRILL R. LOTT, Personnel Superintendent, The Sperry Gyroscope Company, Brooklyn, N. Y.

The inquiry was recently put to a man who had been intimately associated with foundry work for many years as owner and operator of a well established foundry and machine shop—"What is a Brass Moulder?" His reply was "We don't know how to describe him, but we know him when we see him work." It would not be surprising to find this to be a typical response of the question were presented to a number of men who had been brought up in the brass foundry business and who had performed all of the different phases of the work connected with it. Some men will say—"What difference does it make if we can't tell what a moulder is as long as we can try him out on a job and see what he does?" But there's the rub. It can't always be done. Of course the ultimate proof of a man's ability is his actual performance but in these days when competition is becoming keener, when modern manufacturing methods demand better organization of work, when material specifications are matters of importance, when skilled moulders are becoming more and more scarce; is it not probable that many advantages may accrue to the industry, to those who operate a brass foundry and to those who labor as workmen, if suitable "man specifications" were available and generally used?

With this in mind consider what these possible benefits might include.

1. Wages based upon service rendered.
2. Incentives for men to become more skilled.
3. Additional supply of workers.
4. Steadier employment.
5. Lower production costs.

Let us discuss these items in their order:

WAGES

Few employers object to paying high wages if they receive high grade service in return. The tendency has been, in the past, to pay moulders a certain rate of wage simply because they were **moulders**. If they did the work assigned, they would be kept; if they didn't they would probably be dismissed or else given a lower grade of work —still drawing the rate of pay allowed a highly skilled moulder. This kept the good men down in their earnings and gave the poor men more than they deserved.

If the **minimum** qualifications for several different grades of workers,—highly skilled—skilled—semi-skilled —were definitely known, would it not be easy to establish rates of pay which would recognize the merit of an individual, and make it more feasible to assign work in accordance with ability?

INCENTIVES FOR MEN TO BECOME MORE SKILLED

With a graduated wage scale, equitably applied, there is a direct financial urge for the unskilled man to improve, and there is a feeling of satisfaction and pride of workmanship enjoyed by the skilled man through the recognition of his abilities.

With the **minimum** requirements of the various grades of workers, specified and known, there is a definite program for development available to the lesser skilled man. With his development comes the increased reward.

ADDITIONAL SUPPLY OF WORKERS

Trade specifications would add to the supply of workers in several ways. They would assist the vocational or trade schools to present more accurate information to the boys making decisions as to the line of work they would like to follow. A greater knowledge of the requirements of the industry would also develop better training programs.

Through the incentives offered, a young man sees a direct line of advancement—a chance to gratify his desire for "opportunities."

STEADIER EMPLOYMENT

In the larger companies organized along functional lines, the employment work is carried on by a separate department. With trade specifications it is easier for the employment interviewer to select men qualified to handle the work as vacancies occur. This decreases the loss of time and spoiled work that would otherwise exist if care were not exercised in the hiring.

Steady employment in a community is another big advantage which results from having a common understanding of the requirements the different grades of moulders.

If work in one company requires the services of additional moulders, the representative of that company can communicate with the proper person in other foundries in the community, to determine the possibility of securing the required help from some of those organizations. The conversation is apt to be something like this:

"Mr. Smith, have you a skilled moulder that you could lend me for a couple of weeks? I have a rush job to get out that I hate to hire a new man for, as the rush will be over in a couple of weeks when I'd have to lay him off again."

"Why yes, Mr. Blank, that would work in fine with our affairs. We had thought it would be necessary to give Bill Jones some time off, for we're just between jobs and have too many men now. Bill is a **highly skilled moulder** and is better than you really need but it would probably help out all around to lend him to you."

Isn't it easy to do business when you know the meaning of the terms used?

LOWERED PRODUCTION COSTS

With pay based on service rendered, with men interested in their work, with steady employment, with less spoiled work and with less waste effort, is it not a logical sequence that there will be lowered cost of production?

HOW TO JUDGE A MOULDER

Is it possible to make a word picture which will describe a moulder? Practices vary in different shops, how can these differences be recognized without having too clumsy a description?

If we consider a brass moulders qualifications, we will find that nearly every one operating a brass foundry has an opinion of what is expected of a man before he can be called a **moulder** and then he has a fairly definite idea of the additional things a moulder must be able to do before he can be called **skilled** and again he has an opinion of certain other things that a **highly skilled** brass moulder must be able to do.

A person taking up foundry work may perhaps start with "tending the fires," then help the moulders close the flasks and do lots of odd jobs around the place before he has a chance to make up a few moulds. He must spend a certain amount of time in a foundry and learn to do a number of things that a moulder does before he can

meet the minimum requirements of a **brass moulder.**

So an analysis of the different things a moulder does, makes it a fairly easy matter to assign these requirements to the various grades of workers, and it is possible to secure a consensus of opinion as to what such minimum qualifications should be, thereby establishing a standard.

The analysis below is submitted to indicate the form such a specification might take. It covers the experience or length of time that a moulder would be expected to serve in a foundry to secure the specified knowledge of and ability to work with materials, moulding processes, core making, repairing, and foundry equipment.

It is not expected that this particular analysis will be generally accepted just as it stands, for although it embodies the expressed opinions of a number of foundry men, it is probably not as accurate a picture as might be secured if more expressions of opinion had been available when it was compiled. Nevertheless, it is believed the principle is sound and can be used to secure acceptable standards for a community and later on for the nation.

Trade Specifications for a Brass Moulder in a Jobbing Shop

	DETAILS	MINIMUM QUALIFICATIONS: Highly Skilled	Skilled	Semi-Skilled
EXPERIENCE	Working in a foundry producing a variety of work....	4 years	3½ years	2½ years
KNOWLEDGE	Familiarity with the treatment and handling of metals to secure castings of the various specified metals:		See Foot Note (1) A	A
Materials				
	Mixing according to specifications	Aluminum	Aluminum, Brass	
	Melting	Brass	All kinds	Brass
	Pouring	Bronze	All kinds	
	Cooling	Copper		
	Cleaning	White Metal	All kinds	All kinds
	Care and preparation of moulding sand:			
	Mixing	See Foot Note (2) ×	×	×
	Riddling			
	Tempering			
	Use of parting sand	×	×	×
	Use of core compounds	×	×	A
Moulding	Bench or Tub Moulding		On plate and gate work simple shapes ×	Snap Flask or Flat back work ×
	Arrangement of patterns in flask	For castings of such work as:	×	Aluminum, Brass, Bronze
	Ramming for various metals		×	
	Slicking	Bushings and intricate shapes with non-uniform sections	×	×
	Setting Cores—Green sand		×	A
	Setting Cores—Baked		×	A
	Drawing the pattern		×	×
	Placing reinforcements—Chaplets		×	×
	Patching		A	A
	Placing gates, vents and sprues		×	A
	Floor Moulding	Same as with Bench Moulding	May substitute this for bench work	A
	Loam Moulding—(3) See foot note			A
	Machine Moulding—(4) See foot note			
Core Making	Making and baking of cores	×	×	
Repairing	"Burning In":			A
	Aluminum	A	A	
	Brass	×	A	A
	Bronze	×	A	A
KNOWLEDGE, USE AND CARE OF EQUIPMENT AND TOOLS				
	Band Saw	×	×	×
	Crane	×	×	A
	Crucibles	×	×	A
	Flasks: Iron, Snap, Wood	×	×	×
	Furnace: Coal, Coke	×	×	×
	Electric	A	A	A
	Gas	A	A	A
	Ladles: Bull, Hand	×	×	×
	Moulding Machines—(4) See foot note			
	Ovens—Baking	×	×	A
	Pyrometers	×	×	×
	Sprue Cutters	×	×	×
	Hand Tools: Bellows, Brushes, Lifters, Mallets, Mirrors, Rammers, Slickers, Spruces, Spoons, Swab.	×	×	×

(1) The symbol A indicates that the specified knowledge or skill IS NOT required for this grade of worker.

(2) The symbol x indicates that the specified knowledge or skill IS expected of this grade of worker as one of the minimum requirements.

(3) A highly skilled moulder might be expected to possess a knowledge of loam moulding, ability to read blue prints, remedy defective draft of patterns by filing, scraping or with wax.

(4) Machine moulding is a qualification that all grades of moulders frequently possess, but is not regarded as being one of the minimum requirements for all brass moulders.

Types of Molding Machines

A Number of Representative Machines Made in the United States and Abroad Described and Analyzed*

Written for The Metal Industry by R. E. SEARCH, Exchange Editor

In Figure 1 is shown a molding machine which, in the opinion of many foundrymen, will do just as good work as the so-called double-ramming, hydraulic pressure machines, formerly so much in vogue in France, one of which has been described.* The type of machine we refer to can be had with a maximum draw of 26 inches for a flask 33 inches deep. This machine is the Osborn Direct Draw Roll-Over Jolt machine, type 403. This machine has a flask capacity with a length over all of 44 inches, a width overall (maximum) of 40 inches; the total height, including the depth of the flask thickness of bottom board and pattern plate equal to 17 inches. The pattern draw is 12 inches, and the actual draw 14 inches; the diameter of the jolt cylinder is 8 inches. The lifting capacity (80 lbs. air pressure) is 1,000 lbs. The approximate amount of free air per mold is 20 cubic feet.

In Figure 2 is shown a gear case job making drag molds first, in the Allyne-Ryan Foundry, Cleveland, Ohio; while the cores are being set the copes are run on the same machine. Change from drag to cope is made in five minutes, since the only operation necessary is the removal and replacing of the bolts that hold the patterns to the roll-over table. These machines are, with the exception of the shoveling of the sand, and in some cases, the rolling out on the car of the completed mold, entirely power operated, either by air or electricity.

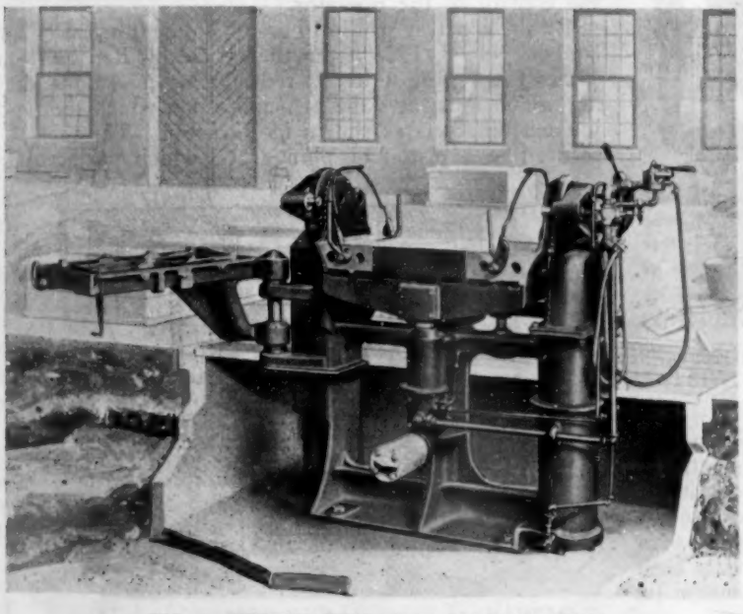


FIG. 1. OSBORN ROLL-OVER JOLT MACHINE

FIG. 2. THE OSBORN ROLL-OVER JOLT MACHINE AND A VIEW OF A GEAR-CASE JOB IN THE FOUNDRY OF THE ALLYNE-RYAN FOUNDRY COMPANY AT CLEVELAND, OHIO.

After the pattern is bolted to the roll-over table, the action of the machine is as follows: The pattern is on the roll-over table which rests on the jolting table during the jolting. After the mold is filled it is jolt rammed by power, struck off, and the botttom boards clamped to the roll-over table.

When the table is rolled over, it is caught by a simple locking device which holds it in accurate alignment with the receiving car, upon which the mold is lowered. Then the pattern is drawn. The receiving car is equipped with the Osborn leveling device, which adjusts itself to any unevenness of the pattern boards.

Under normal working conditions less than one-half minute of time is consumed in all the machine operations on any mold. These machines are rolled over on balanced centers, and are noted for their small consumption of air. The wearing parts are protected and carefully guarded against dust and dirt—alignment is assured by absence of adjustments, rigid construction and provision for re-

*Other types of molding machines were described by the author in THE METAL INDUSTRY, August, 1924, pages 315-317.

placement of bearings controlling the alignment, which is seldom necessary. These roll-over machines are automatic, are highly recommended for difficult draw work on which there is to be considerable duplication, particularly on long runs. These machines are all equipped with double leveling devices, making it practicable to mold both the drag and cope at the same time; or two copes and two drag molds side by side where it is desired to do so, and where the type of flask makes it possible within the capacity of the machine. This line of machines may now be had with or without a variable flask space device.

Another important American molding machine is the combination jar, squeeze, roll-over, pattern-drawing machine, shown in Figure 3 and made by the Johnston & Jennings Company of Cleveland, Ohio.

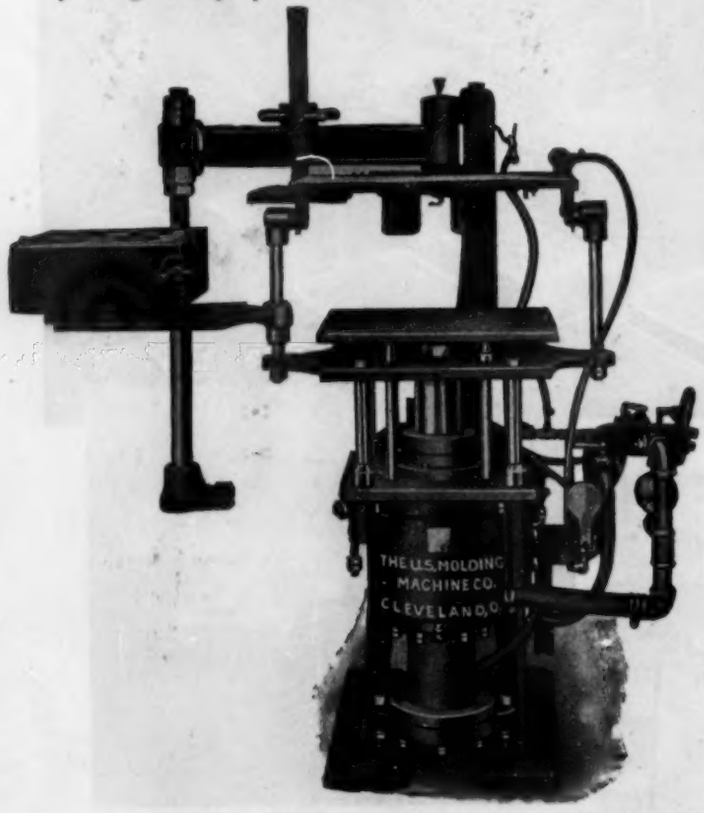


FIG. 3. A COMBINATION JAR, SQUEEZE, ROLL-OVER PATTERN-DRAWING MACHINE, THE U. S. LINE MADE BY THE JOHNSTON & JENNINGS COMPANY

Complex as its performances are it is simple in construction. By its designers it is claimed to be practically fool-proof; that is to say, nothing whatever about it can get out of order or become loose under the most severe usage. It contains no complicated valves, springs or gears and every motion is positive. It is especially built for the well known hard usage which is the common lot of every molding machine in the average foundry.

Its operation is much simpler than its formidable name, thus: place the flask on the machine in the usual way, fill with sand, jar, set the bottom board in position, squeeze the mold and pattern plate by admitting the air into the counterbalanced draw cylinder, roll over, release air in draw-cylinder, start vibrator, unclamp mold, and raise pattern out of mold by admitting air into the draw cylinder. This cylinder, being counterbalanced, gives it a steady movement, and enables the drawing of the most complicated patterns. No leveling device is necessary, as the squeezing operation levels the bottom board with the pattern-plate. These machines are equipped with gauge and pressure relief valves, which can be set to the required pressure, thus pressing all the molds alike if so desired. It is also provided with a vibrator, knee and blow-valve. The swing-out arm is ball-bearing and easily operated. They can also be used in connection with pattern on one side of the plate to draw flask away from plate as well as stripping plate. The four adjustable lift posts are so arranged that they can be used to operate the stripping plate or lift flask away from the pattern-plate.

A PLAIN JOLT MACHINE

This device is purely an American idea and invention. It is really the very last word in molding machine engineering. According to various experts in foundry practice, both here and abroad, opinions differ on the important question of mechanical sand ramming; that is to say, in the good old-fashioned American foundry parlance, **jolt-ramming**. In a squeezer type of machine the density of the sand is probably the greatest nearest the press-head, and the density varies according to the depth of the sand, no matter what the method of ramming may be. This does not matter in shallow molds, but when the molds are deep the efficiency of the squeezer is naturally reduced and special devices have to be resorted to in order to obtain the proper intensity of ramming and hence the most suitable density of the sand for the specified purpose. The difficulties that arose in deep ramming led to the discovery of the principle upon which a plain jolt machine works. The operating principle consists in a falling mass of sand brought suddenly to a stop by impact against a solid, immovable body. The jarring action thus effected consolidates the sand in its flask, and the maximum density is given to the sand that adjoins the plate upon which the flask rests. The number of jolts is under the control of the operator.

By the courtesy of the Foundry Trade Journal of England of July 5, 1923, from the article by Ben Shaw and James Edgar, the writer is reproducing a sectional drawing which illustrates the principle upon which the typical jolt machine acts as shown in Figure 4. The table A is secured to a piston or plunger C, which fits accurately

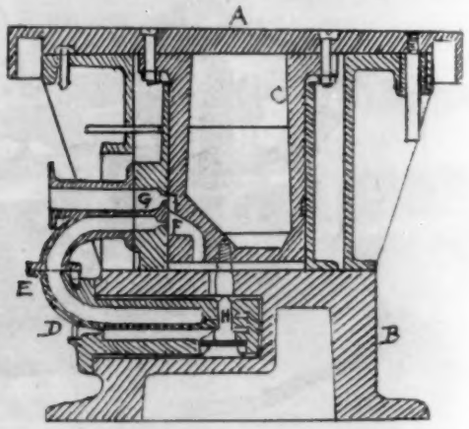


FIG. 4. SECTIONAL VIEW OF A TYPICAL JAR-RAMMING MACHINE

into the air cylinder. A casing about the cylinder is secured to the anvil or base-block B. The air inlet is through D and the lift-pressure through F. The lift cuts off the pressure and the air is exhausted through G, when the piston falls back, which operates a valve at H. This valve controls the re-entry of the compressed air and forms a cushion which reduces the effect of the jarring action on the machine and on surrounding work. This type of machine is particularly suitable for jobbing foundry work, where but a few castings from one pattern are called for at one time.

British Institute of Metals

Abstracts of Papers Read at the Autumn Meeting in London, England, September 8-10, 1924

RECENT DEVELOPMENTS IN NON-FERROUS METALLURGY IN THE UNITED STATES WITH SPECIAL REFERENCE TO NICKEL AND ALUMINIUM BRONZE

THIRD AUTUMN LECTURE DELIVERED BY W. M. CORSE.

The general plan of the Third Annual Autumn Lecture is to describe recent non-ferrous metallurgical developments in the United States with special reference to those that are new or those about which published information has been difficult to obtain.

The developments in the brasses and bronzes were so well covered by Sir Henry Fowler in the Second Autumn Lecture that no extended reference to them is made.

Nickel is described from the historical standpoint and the various outstanding data in its development are given.

The occurrence of nickel is discussed and the smelting of the ore into so-called Bessemer metal is described.

The refining methods differ with each of the three principal companies, although the smelting methods are practically the same.

Each method of refining is outlined. These are the Orford, Mond, and Hybinette Processes.

The properties of nickel are given and its commercial uses are mentioned in detail.

The important alloy of nickel and copper called Monel metal is described and this topic is concluded by paragraphs on the Alloying Properties of Nickel and its Non-Metallic forms.

The copper aluminum alloy known as aluminum bronze is next described with special reference to its commercial development rather than its scientific development.

This interesting series of alloys has found many important uses, such as for worm gear wheels for motor trucks, automobile parts and other structural pieces requiring resistance to vibratory stresses or fatigues.

The addition of lead to the standard aluminum bronze has given a new alloy of splendid wear resisting properties. The result of a special test of such an alloy shows excellent results.

The dream of many a foundryman to avoid the use of sand for molding purposes may come true, if the new Holley "Long life mold" process using these molds made of cast iron, proves to be the success that is at present indicated. This applies to mass production work. This process is described and results with reference to the economics and the practice are given.

The lecture concludes with short references to Ambrac metal, Frary metal, and the series of nickel chromium iron alloys occupying the field of metallurgy which may be called "No Man's Land."

A METHOD FOR MEASURING INTERNAL STRESS IN BRASS TUBES

BY ROBERT J. ANDERSON AND EVERETT G. FAHLMAN.

A new method is described for the quantitative estimation of longitudinal internal stress in tube shapes—for example, cold-drawn brass tubes. It is shown that the major stress is longitudinal, and the stress in the outer part of the wall of the tubing is a longitudinal tensile stress, while that in the inner portion is a longitudinal compressive stress. The summation of the balanced stresses, of course, is zero. Absence of circumferential stress in tubes is indicated by the failure of diametrically cut rings to spring in or out on being slit in two. Experiments showed that the usual cutting methods which have been applied to bars and rods for the estimation of stress are not applicable to tubes, especially where the bulk of the stress is longitudinal.

The method described in the paper for measuring longitudinal internal stress is called the strip method, and is carried out by slitting a narrow strip longitudinally in a piece of tubing; for example, a strip 2.75 inches long and 0.10 inch wide in a 3.25 inch tube length; and then releasing one end of such a slit strip by cutting. Stress is indicated by the springing out of the freed end and can be calculated by a formula based upon the modulus of elasticity of the material and the distance in movement of the freed end.

The method is useful for determining the amount of internal stress in cold-drawn tubes, and for examining quantitatively the effect of a low-temperature anneal upon stress release. It has often been thought that because cold-drawn brass does not crack on application of an accelerating cracking agent it is free from internal stress. The strip method is applicable for the quantitative estimation of stresses inferior to those necessary for cracking under the application of mercurous nitrate.

SEVENTH REPORT TO THE CORROSION RESEARCH COMMITTEE OF THE INSTITUTE OF METALS

BY GUY D. BENGOUGH AND R. MAY.

The Seventh Report to the Corrosion Research Committee of the Institute of Metals considers the problem of corrosion largely from the point of view of the "Scale" of corrosion products which soon forms on the surfaces of such metals as copper, zinc and brass immersed in sea-water. In the Report an account is given of the more important reactions which lead to the production of these scales, and of the way in which they are affected by changes in the conditions surrounding the metal and in the composition of the metal itself. The studies of copper and zinc are preliminary to that of brass. An important feature of the Report is the study of the behavior of high-speed streams of aerated sea-water in glass and brass tubes and the correlation of the behavior of such streams with local corrosion. It is suggested that a large proportion of tube failures in modern condensers is due to local impingement of aerated sea-water, and that the actual distribution of corroded tubes in condensers often supports this view. The rapid corrosion is due to the local removal of protective scale by the impinging stream. Certain types of preformed scale, however, may be very resistant to this type of action, and a useful field of work has been opened up in this direction. The occurrence of "dezincification" has been found to be due, not to bad mixing of copper and zinc in the manufacture of brass, but to the absence of arsenic from tubes; even a mere trace of arsenic has been found to prevent "dezincification" in condenser conditions. The presence of arsenic, however, is by no means always desirable and in some conditions a "dezincing" tube may behave better than a "non-dezincing" tube.

Careful observations on the electrolytic method of protection of condenser tubes have tended to throw grave doubts on the utility of this process, per se; usually the results are negative but occasionally good results have been reported and it seems probable that these must be due to chance secondary effects, particularly of the anode products; the great difficulty with which the process has to contend in condensers is the uniform distribution of the

current along the tube; most of it is shortcircuited to the water-boxes, tube plates, etc., which are protected in preference to the tubes.

On the theoretical side the view is adopted that the corrosion of brass may be due to metal—ion concentration cells or oxygen—distribution cells; these may either reinforce or oppose one another, according to the conditions. With high-speed water streams the metal-ion concentration cell may become the more powerful and render the metal anodic and severely corroded; deposits of sand, porous masses of corrosion products, etc., may cause oxygen distribution cells to become active and set up local corrosion, but the most rapid cases of corrosion seem to belong mainly to the former type. Sometimes the two types of action reinforce one another, as when pits are started by oxygen-distribution effects, owing to the unequal porosity of the scale; the thin layer of scale which covers them is finally broken down by the action of an impinging aerated water-stream and the attack is carried on by the action of a metal-ion concentration cell.

The Report is a bulky document covering 150 pages and contains a large amount of information about various and little known phases of condenser tube corrosion; it is impossible to give an adequate summary in the space at our disposal.

SOME EXPERIMENTS ON THE INFLUENCE OF CASTING TEMPERATURE AND MASS ON THE PHYSICAL PROPERTIES OF ADMIRALTY GUN-METAL

By Francis W. Rowe.

The author gives the results of some typical tests on admiralty gun-metal (copper 88%, tin 10%, zinc 2%) conducted under works conditions.

Three boxes of test bars were moulded each containing three bars, one 12 in. x ½ in. x ½ in., one 12 in. x 1 in. x 1 in., and one 12 in. x 2 in. x 2 in. The boxes were cast at 1,200° C., 1,150° C., and 1,100° C. Tensile, hardness and impact tests were made on the bars thus obtained. The 2 in. square bar was cut up to give a piece ⅞ in. square from the center and two pieces ½ in. square from the outsides. The ½ in. x 1 in. bars were machined straight into textile and impact pieces.

The figures show the best results to be obtained in all sizes of bars with the lowest casting temperature, i.e., 1,100° C. and the best tests of all with the ½ in. square bar cast at that temperature.

STUDIES IN THE ALUMINUM-ZINC SYSTEM

By Tomojiro Tanabe, (Japan).

Previous investigations into the constitution of the alloys of aluminum and zinc have been very numerous, but work hitherto published has been almost entirely limited to thermal analysis and microscopic examination, and the results of tests in other directions, notably in the physical, are very few.

Accordingly, the present writer has investigated this system in various directions, to confirm the new diagram of Hanson and Gayler, and to make clear the nature of age-hardening.

The mechanical properties have also been studied.

METAL SPRAYING AND SPRAYED METAL

By T. Henry Turner and W. E. Ballard.

This paper brings under consideration the process of metallization invented shortly before the war and known generally as Schoop's metal spray process. Held back in its development by the unsettled condition of industry it is nevertheless being operated commercially at the present time in all the more important countries. The gas operated metal spraying pistol now used in England is illustrated together with a rumbling barrel type of metallizing apparatus which is used for repetition work on small articles. Special devices have been introduced for coating the outside and inside of tubes and pipes. All articles to be sprayed are carefully sandblasted as it has been shown in practice that the metallic coatings adhere better to surfaces so prepared. In certain cases preheating of the article to be coated is recommended as this again tends to improve the adhesion. By spraying lightly on to glass slips it has been possible to examine the individual particles of the sprayed metals. Photomicrographs of these show that the metal must be molten at the instant it strikes the surface to be coated. The remarkable shapes of the metal splashes shown will probably be of great interest to many. Solid articles have been built up by spraying and proved machineable and resonant.

Figures are given for the hardness and density of such built up metals. Tables are included which show the wire form and fusible in the oxy-hydrogen flame may be sprayed on to practically any surface, e.g., on to paper, fabric, wood, or metal. The surface produced is always matte but may be polished if desired. The matte surface is an ideal foundation for paints. Considerable technical experience has now been obtained and completed structures are being uniformly coated all over with any desired metal for protection against atmospheric corrosion, chemical attack or furnace conditions. The process has also been used for building up repair and salvaging operations. It has found a particular field in ship work and is recommended for the zincing of rail ends and fishplates for connecting purposes on electric railways as it does away with the necessity of copper connections and continual cleaning.

COMPARATIVE RESULTS ON COPPER-SILICON-ALUMINIUM AND OTHER ALUMINIUM ALLOYS AS OBTAINED ON SEPARATELY CAST SPECIMENS AND SPECIMENS CUT FROM A CRANKCASE CASTING

By E. H. Dix, Jr., and Lieut. A. J. Lyon.

From the results of the investigation it has been concluded that the copper-silicon-aluminium alloy is particularly well adapted for complicated castings which do not require a large amount of machining. In many parts used in the construction of aircraft engines, such as crank-cases, manifolds, cover plates, and housing, require very little machining, and the finishing of the castings can practically all be done on a milling machine. This copper-silicon alloy is particularly well adapted for this type of work, and is recommended as a substitute for the No. 12 alloy wherever foundry difficulties due to shrinks, draws, and cracks offer serious difficulty. The casting properties of Alpax are very similar to those of the copper-silicon-aluminium alloy, but it is not considered a practical alloy from the Air Service standpoint, due to the fact that it has a very low proportional limit and is inferior to the copper-silicon alloy in this respect. Lynite 195 is shown to have uniform and desirable physical properties. The proportional limit is considerably above any of the alloys tested. The foundry practice, however, is more difficult for this type of an alloy, and the fact that it has to be heat-treated increases the cost of production. The tendency to warp and crack during the heat-treatment would necessitate provision being made in the design for the use of this alloy; that is, a large complicated casting designed for either No. 12 or copper-silicon-aluminium alloy probably could not be poured in Lynite 195 with any degree of success. 8 per cent copper-aluminium alloy is suitable for the general run of castings and can be cast in sections 3/16 in., or greater, in thickness without any great trouble. It is liable to shrinkage cracks, but this can largely be overcome in many designs.

THE EXTRUSION OF BRASS ROD BY THE INVERTED PROCESS

By R. Genders.

The experiments described in this paper and carried out on a manufacturing scale, although not extensive enough to constitute a complete study of the method of extrusion of brass rod by the inverted process, have provided ample data to show that the inverted process in incapable of producing internally defective rod when sound billets are used.

Precautions are necessary to secure good surface, the method adopted for the present being the avoidance of entrance of the skin of the billet into the region of flow. The increase in the proportion of discard so produced, although rendering the ejection of the billet shell more simple, brings the total discard above the ideal minimum of about 5 per cent, which might otherwise have been possible. Even so, however, the proportion is considerably less than in the ordinary method.

The observations of the relative pressures required by the two processes operated on a small scale are fully confirmed by the large-scale practice. For the same types of material, the pressure required by the new process is about 25 to 35 per cent, lower than for the ordinary process. This advantage must also be reflected in decreased wear and tear of the plant.

The structure of the extruded rod does not show the concentric zones of material varying in crystal size and physical properties often produced by the peculiar nature of the flow which obtains in the ordinary process. The rear portion of the rod is variable in structure and hardness from centre to outside, but in a continuous gradient.

For the manufacture of ornamental sections and other types of material in which absolute reliability is not essential or is subordinate to the requirement of immaculate surface the advantage of the inserted method lies mainly in its saving power. For certain purposes it may be limited to some extent by the dimensions of the hollow plunger, although it is estimated that with a 1,000-ton press, a container of 8¼ in. diameter and a plunger of 5½ in. bore can be used.

For the production of engineering material, however, the inverted method possesses the advantage that all possibility of the occurrence of the "core" effect is excluded, and that, if defects are allowed to arise, they will be visible on the surface of the rod. It is thus safe to extrude the billet nearly completely and so reduce scrap to a minimum without risk of the rod being affected internally.

The experiments carried out have been confined to the production of 1-in. rod, but no serious difficulty is foreseen in the application of the method to the varied practice of the modern works.

Further work will be necessary before the method can be regarded as giving the best results of which it is capable. The experiments described have, however, been sufficient to confirm the previous small-scale work as regards the type of flow, internal soundness of rod, and the saving of power. There seems to be no reason why extruded rod made by this process should not rank as a thoroughly reliable engineering material.

INVESTIGATION OF THE EFFECTS OF IMPURITIES ON COPPER—PART II.—THE EFFECT OF IRON ON COPPER

By D. Hanson and Grace W. Ford.

Iron has been shown to exert a very considerable effect on the properties of pure copper; the effect of this impurity is, in many respects, very much greater than that of oxygen. The observed effects on the mechanical, electrical, and other properties are in keeping with the structure and constitution of iron-bearing copper, as revealed by a microscopical study of this material. Solid copper will dissolve about 4 per cent of iron at 1100° C., but the solubility at lower temperatures is much less. Within the limits of solid solubility the effect of iron is considerable, particularly on the electrical resistivity, which increases rapidly as the iron content is raised; this increase is so rapid that iron must be regarded as extremely deleterious in copper for electrical purposes. When the iron content exceeds about 0.2 per cent the effect on the resistivity depends largely in the heat-treatment of the material.

The effect on the tensile strength is less than might have been anticipated in the case of a soluble impurity, and, although in this respect iron has more effect than oxygen, it still produces a relatively soft material, even when the copper is saturated with iron. The tensile strength is raised by 2 per cent of iron from 14.5 tons per sq. in. to about 20 tons per sq. in. The effect of heat-treatment is relatively small, in spite of the large differences in solubility of the iron, and a considerable improvement in strength as a result of heat-treatment, such as can be obtained in steel and some aluminium alloys, has now been realized.

Iron has no great embrittling effect, and copper containing iron can be rolled with great ease.

Iron is a deoxidizer for copper, but it creates difficulties during casting, owing to the formation of films that destroy the continuity of the metal. The deoxidizing action is not great, as a considerable excess of iron would appear to be required to remove all the oxygen.

Copper containing iron as a sole impurity is difficult to machine: it is soft, and "drags" under the tool.

CASTING BRITANNIA VASES

Q.—We desire to make some vases like the inclosed sketch and we want to make these out of very cheap metal that we can silver plate very easily.

A.—We suggest you use a mixture of Britannia metal for this work.

No 1, Best Quality	No. 2.	No. 3.
94 Tin	80 Tin	60 Tin
3 Copper	1 Copper	10 Antimony
3 Antimony	9 Antimony	28 Lead
	10 Lead	2 Copper

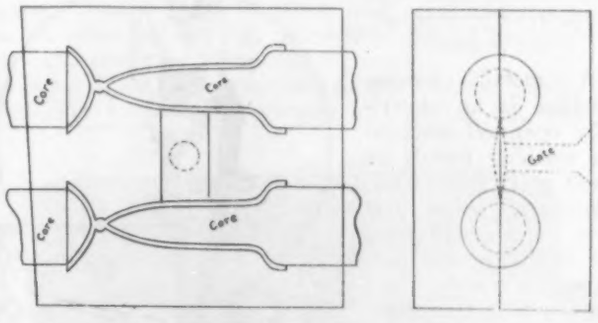


FIG. 1. MOLDING BRITANNIA VASES.

We believe No. 2 mixture to be the answer for your work.

Fig. 1 shows the method we would use in making the mold or die. We think it would be necessary to obtain a hand operated die-casting machine to do this work properly. If you wish we will furnish you with the name of die makers and machine makers who can give you all the information you may desire on this line of work.
information you may desire on this line of work.—W. J. Reardon.

Modern Methods of Cleaning Metals

How the Application of Modern Machinery and Volume Production Methods Has Lowered Costs in the Metal Cleaning Department and Insured Uniformly Thorough Work

Written for The Metal Industry by A. CLEANER

The experienced factory engineer has long realized that cleaning metal parts thoroughly at different stages of manufacture reduces production costs and improves the appearance and wearing qualities of the finished product.

For example, he knows that there are fewer rejections due to poor finish if the parts are cleaned thoroughly before painting, enameling and plating. Pitting, cracking and peeling are eliminated. The finish is smoother and better looking and has better wearing qualities.

Cleaning before punching or stamping saves expensive dies from being worn out by grit and chips which stick to uncleaned metal. Cleaning before machining speeds up production and lengthens the life of high-priced machine tools.

Better results, fewer rejections and greater production at the inspector's bench also go hand in hand with thorough cleaning work.

In short, it pays doubly well to clean metal parts thoroughly.

THE ECONOMY OF CLEANING METALS BY MACHINERY

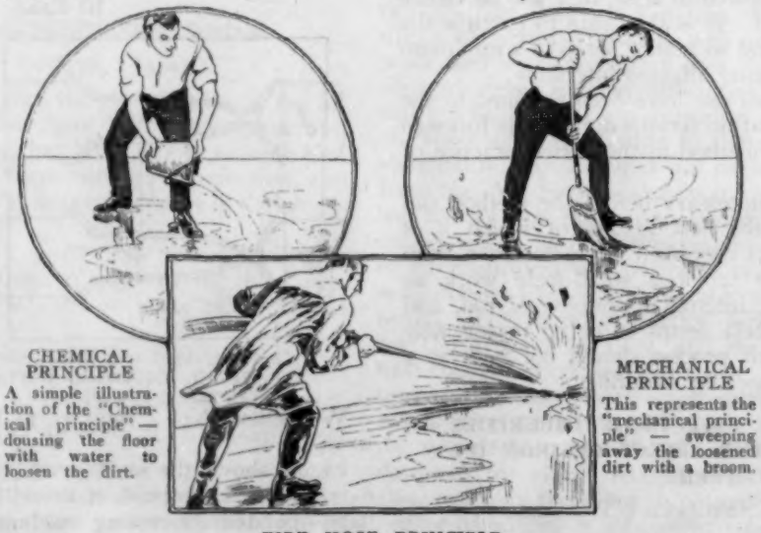
Great savings have been made in practically every department of a manufacturing plant by turning hand operations into automatic machine operations. Within the last six years these same savings have been applied to the cleaning of metal parts in a large number of plants. It has been found that one machine, even a small one, will replace a number of men. It will do better work in less time and in a smaller floor space.

Machines make the work easier. They eliminate sloppy, unhealthy working conditions and make it easier to obtain and keep good help.

Each and every piece will be cleaned as thoroughly as the next one. No matter how conscientious a workman may be, he cannot do his work with the regularity of a good machine.

THE METAL CLEANING MACHINE AND HOW IT WORKS

A metal cleaning machine is an electrically operated machine for washing metals or metal parts free of oil, lubricants, chips and dirt. The metal parts are fed into the machine at one end. They come out at the other end uniformly cleaned. The operation is simple, inexpensive, progressive and many times faster than the best of old fashioned methods. The human element is excluded as far as possible. Uniform results are obtained with all grades of help, at all times of the day.



CHEMICAL PRINCIPLE
A simple illustration of the "Chemical principle" — dousing the floor with water to loosen the dirt.

MECHANICAL PRINCIPLE
This represents the "mechanical principle" — sweeping away the loosened dirt with a broom.

FIRE HOSE PRINCIPLE
This shows how the fire hose combines the "chemical" with the "mechanical" cleaning principle. The dissolving action of the water loosens the dirt, while the force of the streams sweeps it instantly away. This action is duplicated and multiplied many times in the metal cleaning machine.

TWO UNIVERSAL CLEANING PRINCIPLES

Every known method of cleaning metal parts employs one or both of the following cleaning principles. The most efficient method of cleaning metals is to utilize both to the fullest possible extent.

The Chemical Principle: The loosening of the foreign matter through the dissolving action of water or chemicals.

The Mechanical Principle: The removal of the foreign matter by mechanical means such as rubbing, wiping, tumbling, etc.

With the old methods, unless hand labor was used only one of these two cleaning principles was brought into action, either the chemical (as in dipping tanks) or the mechanical (as with dry tumbling methods). It is true that scrubbing with brushes, rubbing with kerosene or gasoline soaked rags, made use of both principles. But it meant handling individual pieces, slow work, high labor costs and uncertain results.

Attempts to combine the mechanical and the chemical means of cleansing in crude contrivances gave unsatisfactory results. The cleaning was far from uniform—the cost still prohibitive.

Then came the fire hose idea—the idea of cleaning metals with powerful streams of solution under pressure. Here the chemical action of cleaning compounds is combined with the mechanical action of heavy, solid streams striking against the work with great force. The cutting, stripping action of these streams does the work faster and more thoroughly than any hand or tank method known.

HOW THE METAL PARTS ARE WASHED

There are two types of metal cleaning machines, hand conveyor machines and automatic conveyor machines. With the hand conveyor machine the operator places the work to be cleaned into tote boxes or racks. He moves these racks through the machine by hand. With the automatic conveyor machine the racks or parts to be cleaned are merely placed on a conveyor and are carried through the machine automatically. The conveyor is operated by an electric motor and its speed can be regulated to insure the proper washing time.

As the work to be cleaned passes through the machine, it is washed by heavy streams of hot cleaning solution from nozzles located above and below the conveyor. These nozzles may be either stationary or they may be so arranged that they turn around and around above and below so as to allow the streams to strike the work from every angle, over and over again.

The cleaning solution is discharged under great pressure. In the small machine the centrifugal pump which throws the water is driven by a ½ horsepower motor, in some of the larger metal cleaning machines a 15 horsepower motor is often used.

As the cleaning action of the machine depends upon the volume of water which can be pumped over the parts to be cleaned in the shortest possible time, the larger the pump and the greater its capacity, the faster the machine. In the small machine illustrated here the pump throws approximately 100 gallons of cleaning solution per minute. In a large machine the washing unit pump throws 1,000 gallons of cleaning solution per minute.

THIS MACHINE CLEANS CONNECTING RODS IN THE MILWAUKEE PLANT OF THE NASH MOTOR COMPANY. NASH USES 10 MACHINES FOR CLEANING SCREW MACHINE PRODUCTS, CYLINDER HEADS, REAR AXLE DIFFERENTIAL HOUSINGS, ETC.

There are machines small enough and low priced enough to be used in the smallest metal cleaning department—even in the different manufacturing departments of a plant such as the screw machine department, punch press department, grinding, plating or polishing departments. The machine illustrated above takes up less space than a tank and costs no more. At the same time it will easily clean twice the amount of work with less help and with far better results.

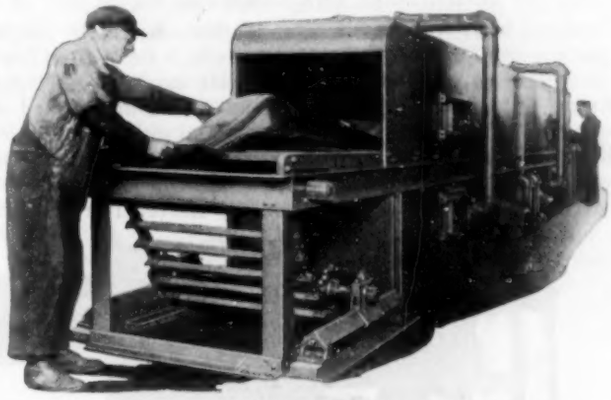
Also there are large machines which handle the entire output of a great plant. The metal cleaning machine used by the Chevrolet Company for cleaning fenders illustrated below is a good example. This machine cleans the entire output of automobile fenders and side rails in the Cincinnati plant of the Chevrolet Company. Similar machines are being used in the Chevrolet plants in Buffalo, St. Louis, Toledo, Oakland, Calif., and Flint, Mich.

AUTOMATIC EQUIPMENT ASSURES ABSOLUTELY UNIFORM CLEANING

The advantages of automatic conveyor equipment more than offset its cost. The operator does not push the racks through the machine by hand. He merely places them on the conveyor to be carried through automatically—rackful after rackful. And the work passes through at a uniform speed—so that the length of the washing period is not left to the judgment of the operator. Each rack, each part, is washed for uniform periods—and is uniformly clean. The human element is entirely eliminated.

Another advantage of the automatic conveyor is that individual pieces too large to fit into racks, may be placed directly on the conveyor.

A conveyor can be used in the small automatic metal cleaning machine. The flight bars may be spaced as far apart as desired, so that the full power of the lower wash can be employed in washing the work from



CHEVROLET MOTOR COMPANY CLEANS THE ENTIRE OUTPUT OF AUTOMOBILE FENDERS IN ITS CINCINNATI PLANT WITH THIS METAL CLEANING MACHINE. METAL CLEANING MACHINES ARE USED ALSO IN THE CHEVROLET PLANTS AT BUFFALO, ST. LOUIS, TOLEDO, OAKLAND AND FLINT.

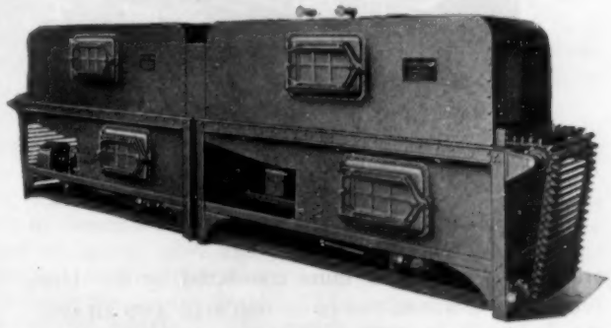
below. This is particularly valuable in cleaning inverted cup or pan-shaped pieces.

METAL CLEANING MACHINES MAY BE ARRANGED TO HANDLE MANY OPERATIONS

Where the work to be cleaned requires both washing and rinsing as a regular process in manufacture, the metal cleaning machines may be arranged to handle both these processes in one continuous operation.

Furthermore, they may be arranged not only to handle washing and rinsing but also lacquering, slushing, drying, etc., thus avoiding expensive individual drying, lacquering and other processing units. The Edmunds & Jones Corp. uses a machine in which the metal parts are washed, then as they pass through the steam blow-off removes the washing solution. The material then passes on to a rinsing unit when another steam blow-off arrangement removes the rinsing solution. The work then passes through a gas heated drying oven, and comes out at the other end not only thoroughly cleaned but perfectly dry and ready for japanning.

Some of the large machines of this type are being used not only for washing, rinsing and drying but also for



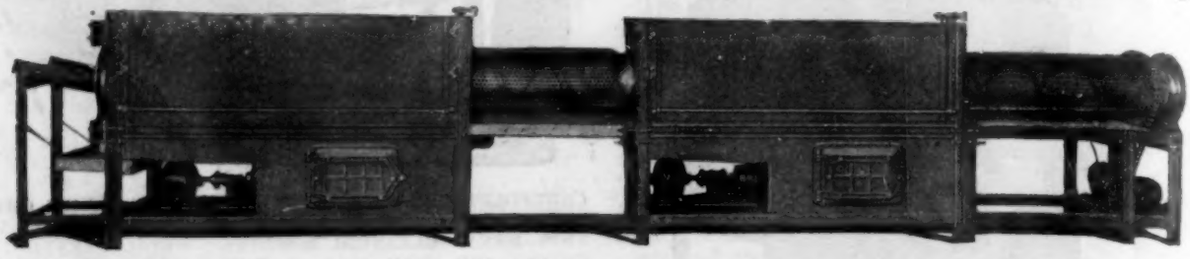
THIS DUAL METAL CLEANING MACHINE WASHES AND RINSES FLATWARE BLANKS BETWEEN TRIMMING AND FOAMING OPERATIONS IN THE PLANT OF ONEIDA COMMUNITY, LTD., ONEIDA, NEW YORK, MANUFACTURERS OF ONEIDA COMMUNITY SILVERWARE. IT IS SAVING $13,000 A YEAR ON LABOR.

slushing with paints or oils. A machine of this type is now being built for the Briggs Manufacturing Company, Detroit, for washing complete automobile frames and then paint slushing them. This machine, when completed, will be more than 11 feet wide and 12 feet high and over 75 feet long.

ELIMINATING THE TUMBLING BARREL

Nuts, bolts, pipe fittings and other intricately shaped parts with blind recesses and parts which have a tendency to adhere to each other such as flat castings and some kinds of screw machine products are usually hard to clean. In the Rotary Drum Type metal cleaning machine illustrated here, they can be cleaned not only more thoroughly but faster and with less chance of injury.

The work to be cleaned is merely shoveled or dumped on to the hopper or chute at the mouth of the machine. It is not lifted or thrown about but gently turned or wormed through a small arc of the drum by helicoid flights. This smooth, rapid, turning motion exposes all surfaces of the work to be cleaned to the powerful wash streams which either come through the meshes of the drum, or which are actualy located within the drum. These drum type machines are built either as single washing or rinsing units or as machines handling both these operations in individual units connected by the drum.



WESTINGHOUSE AIR BRAKE COMPANY, WILMERDING, PA., CLEANS MANY TONS OF SCREW MACHINE PRODUCTS DAILY IN THIS MACHINE—ALSO COCK CAPS, VALVE BODIES AND PIPE BRACKETS. TWO OTHER MACHINES ARE ALSO USED HERE. WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY USES 5 MORE MACHINES.

CLEANING METAL PARTS OF ODD SIZE AND SHAPE

A machine is used for cleaning axle housings in the Syracuse plant of the Adams Axle Company, Inc.

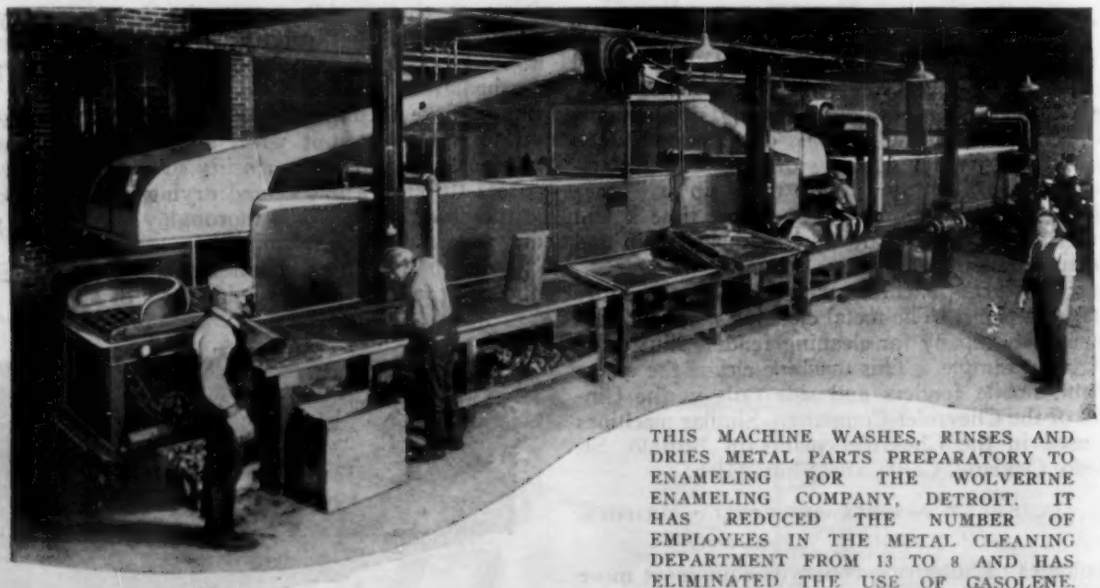
This machine illustrates how readily the principle of cleaning metals by machine can be applied to practically any part. Metal parts which formerly could not be cleaned except by painstaking and costly hand methods are now handled in great volume, and the work is of a better quality. Stampings, castings, screw machine products, pieces of every size and shape can be cleaned thoroughly by some special machine to meet special problems.

FITTING THE METAL CLEANING MACHINE TO THE ROUTING PLAN IN PROGRESSIVE PRODUCTION

And these machines can be made to fit even the most unusual routing plan. A machine is used in the Dodge Brothers plant along with three others of the same kind, for cleaning axle housing, connecting rods, gears, cylinder heads and other automobile parts.

The material to be cleaned travels along to the different stages of production on overhead trolley conveyors. These conveyors pass right through the machine, the parts being suspended from above. As they pass through the two sets of wash arms they are cleaned on both sides simultaneously. They come out of the machine all cleaned and travel along to the next operation, still on the trolley. A partial list of the material cleaned in machines:

Axle housings	Oil pan assembly
Screw machine products	Valve parts and fittings
Visible file metal parts	Cylinder heads
Grease gun shells	Camera parts
Printers' type and plates	Metal furniture parts



THIS MACHINE WASHES, RINSES AND DRIES METAL PARTS PREPARATORY TO ENAMELING FOR THE WOLVERINE ENAMELING COMPANY, DETROIT. IT HAS REDUCED THE NUMBER OF EMPLOYEES IN THE METAL CLEANING DEPARTMENT FROM 13 TO 8 AND HAS ELIMINATED THE USE OF GASOLENE.

Connecting rods	Brake drums
Small stampings	Automobile parts
Aluminum radio parts	Steering gear housings
Aluminum pans	Drawn steel pieces
Fenders and side rails	Brake drums, hubs, flanges
Screw machine products	Transmission cases
Machined parts	Differential housings
Implement parts	Watermeter machined parts
Aluminum piston bodies	Gears after hobbing

The Manufacture of Phonograph Matrixes

A Review of the Modern Methods in Use

By SAMUEL WEIN*

The first patent relating to the manufacture of phonograph record matrixes is credited to a Mr. Jones, and granted in 1902. His process consisted in preparing the surface on which the sound has been engraved with a suitable conducting medium (graphite or the precipitation of metals) and thereafter subjecting this to the action of the usual electrotyping solution, copper being the most popular and convenient at that time.

Many contributions have been made in the Jones process, and only relate to the refinding of the successive phases or steps in the modus operandi. It is not the object of this paper to review the various contributions, which can be done by a careful search of the literature, but, rather, to review the specific methods commonly used in two plants.

Before we go into details of the methods of procedure in the manufacture of these matrixes, it would be well to study the problem of the electroplater as he sees it in actual practice.

The "artist," be it singer, musician or otherwise, is placed before a horn into which he directs his voice or sound. At the apex of this horn is attached a recorder built on the same lines (more or less) as the ordinary reproducer. In this case use is usually made of a diamond or sapphire point, in place of the steel point. This point is made to touch a "wax" tablet revolving in a spiral movement. As the variations in sound are created, the diaphragm varies in pressure, giving corresponding variations in the recording point; these in turn are recorded in the wax tablet.

In place of wax as a recording medium, what is really used is a metallic stearate (insoluble soap) to which has been added a vegetable or mineral wax in order to secure a correct hardness in the recording tablet. A review of the literature in the manufacture of these "waxes" was given by the author[1] in 1921.

Graphite free from grease or lumps is usually used in treating the wax tablet prior to its being placed in the copper plating solution. Clark[2] modifies the conventional method by adding silver nitrate to the graphite so as to increase its conductivity, and in this manner secures an immediate deposit of copper on the wax surface. The improved formula is the following:

Ceylon graphite	1 lb.
Silver nitrate	1 oz.
Distilled water	1 pt.

The ingredients are mixed together and heated in a porcelain dish over a water bath until dry. The mixture is then transferred to a graphite crucible and brought to a red heat. After cooling it is sifted through fine silk onto the wax disc.

The graphite, with or without the silver nitrate, must now be well rubbed over the surface of the disc so that it will be well covered with this. This process is usually first done by means of a soft camel's hair brush, and applied by hand for about 10 minutes, thereafter a brush operated mechanically takes the place of the manual brushing, resulting in a highly polished wax surface.

A hole is now drilled in the center of the disc and a metal button is placed therein to act as the contact maker. An "arm" is attached around the rim of the wax disc so as to hold it perpendicular in the electrotyping solution. On the reverse side of the wax disc is applied a layer of wax, so as to act as a "stop off" medium, preventing, as it does, the deposition of the metal on the reverse side.

The wax disc is now ready for the electroplating solution. Some platers prefer to wash off first the excess graphite, using a solution of equal parts of distilled water and ethyl alcohol. This operation must be carried out very fast, as otherwise the solution will tend to dissolve the wax to some extent.

The wax tablet is placed in a "primary copper solution." Clark recommends the following composition:

Copper sulphate	2 lbs.
Sulphuric acid	½ oz.
Distilled water (to make)	1 gal.

He uses a hard rubber jar for each individual disc, whereas other workers prefer to place all of the discs in a large tank.

A current of 8 amperes is used for 10 minutes, and thereafter increased to 12 amperes, and for the next 30 minutes the current is increased gradually until it is 20 to 24 amperes, or about 40 amperes per square foot. The disc is then allowed to remain therein for 1½ hours.

Elias Schor, who has devoted much attention to this phase of electrochemistry, finds that by the addition of oxalic acid to the primary copper electroplating solution, a much faster "flash" is obtained on the graphited wax disc. The proportions he finds best are 1 pound of oxalic acid to the 100 gallons of solution (about 1 gram per liter).

After a film of copper has been deposited on the graphited disc, at the expiration of 1½ hours, the disc is taken out and washed in running cold water, and thereafter transferred to the second copper electroplating solution. The one used commercially in the plant Mr. Schor installed consists of the following:

Copper sulphate	2 lbs.
Sulphuric acid	5 ozs.
Aluminum sulphate	1½ ozs.
Water	1 gal.

The disc is subjected to 12 amperes (about 20 amperes per sq. ft.) and 1½ volts for 24 hours. The electrolyte is operated at normal temperatures; and is agitated in any convenient manner. Mechanical means have been devised whereby the electrolyte is agitated by a reciprocating paddle, or by pumping air through it, or by making the discs run through the entire length of the electrolyte.

On the expiration of the allotted time in which to build up a sufficient thickness of the copper "shell" the wax disc is taken out of the electrolyte, washed in running water, and the metal deposited lifted off. This is done by means of "lifting" the copper shell from the wax tablet by means of a dull scraper. Great care must be exercised in this operation, so as to avoid buckling or scratching the copper plate. This copper shell is termed the "master matrix." The rough edges of this shell are then removed by means of an emery wheel.

The reverse side of this copper shell is attached to a conductor by soldering and then coated with a heavy film of wax, so as to prevent deposition of metal thereon. The side which had been next to the wax is treated with gasolene, and all traces of wax are dissolved off, finally

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*Formerly Chemist for The Emerson Phonograph Company, New York.

[1] Wein. METAL INDUSTRY, vol. 19, page 274, 1921.

[2] Clark. American Electroplaters Soc. Monthly Review, vol. 7, April and May, 1920.

washing the metal shell with ethyl alcohol. Some manufacturers prefer to clean it then with a 6% solution of caustic soda and again washing it in running water. Then the shell is given a coating of silver:

SOLUTION A

Silver nitrate	1½ lbs.
Distilled water	7½ qts.

SOLUTION B

Sodium chloride	5 lbs.
Distilled water	7½ qts.

Mix solutions A and B together, the precipitated silver chloride is washed free from the soluble salts, and thereafter dissolved in

SOLUTION C

Sodium cyanide	2¾ lbs.
Distilled water	12 qts.

The resultant solution should be well filtered.

Finely divided calcium carbonate is added to this solution to form a thin creamy paste. The silver paste is rubbed over the copper disc until it has a clear coating of silver. It is then washed with distilled water and dipped in a solution of tincture of iodine made up as follows:

Tincture of iodine	4 ozs.
Distilled water	5 gals.

The solution is readily affected by strong light, and because of this it should be kept from direct sunlight. A new solution should be made twice daily. This operation permits the deposition of a layer of copper on this surface which can be "stripped" or separated without difficulty.

Before this matrix is then placed into the primary copper electroplating solution, it is well to wash it in running water.

Herrick[3] simplified this silver process considerably. The well cleaned copper matrix is placed in the following solution:

Silver chloride	2½ ozs.
Potassium cyanide	6 ozs.
Water	1 gal.

Thereafter in the following solution:

Tincture of iodine	8 ozs.
Hydrochloric acid	1 oz.
Water	20 gals.

After the shell has remained in the primary electroplating solution for 1½ hours, it is washed in running water, and transferred to the second copper electroplating solution for 24 hours and the two plates again stripped, care being taken so as not to buckle these at all.

This second shell or plate is termed the "stamping matrix," and, as the name implies, it is the plate with which the duplicates are stamped or pressed into the plastic shellac phonograph record compound.

The reverse side of the copper stamper is "tinned" and "sweated" on to a steel plate to facilitate handling.

Copper is a soft metal, and as a die wears down rapidly so that many duplicates of the plastic record compound could not be made. In order to remedy this the surface of the copper stamper is plated with a film of nickel. A typical solution is:

Nickel ammonium sulphate	4 ozs.
Nickel sulphate	12 ozs.
Sodium chloride	1½ ozs.
Boric acid	2 ozs.
Water	1 gal.

A current of 5 amperes per shell is employed and the plating continues for about 20 minutes.

[3] Herrick, M—— Industry, vol. 16, pages 20 and 269, 1918.
[4] Wein. Brass World. November, 1920, page 314.

The deposition of nickel on top of the copper shell will tend to "fill in" the very fine grooves of the record. To eliminate this difficulty, all of the disc record firms are now depositing nickel directly onto the graphited wax disc. The solution in this case, according to Schor, consists of:

Nickel ammonium sulphate	10 ozs.
Nickel sulphate	10 ozs.
Water	1 gal.

The temperature of the bath should be 32° C; if lower the deposited nickel will curl; if higher it is brittle. The amperage is between 8 and 10, and the voltage 2. In the course of 1½ hours, a deposit of .002" (0.05 mm.) in thickness will be obtained. The disc is taken out, washed in running water, and copper deposited thereon for 24 hours. After the plates have been separated, freed from any surface dirt, and backed up with the customary steel plate, duplicates are made therefrom in the manner as already described, except that in this case, in the place of the silvering solution, use is made of a 1° Be' sodium bichromate solution.

In the place of the ordinary copper sulphate solution, experimenters have tried copper ethyl sulphate and copper fluoride[4] for fast depositing solutions.

Various additions agents have been added to the copper and nickel plating solutions. But these were found to give rise to various difficulties. The electrolytes without addition agents have proved satisfactory in themselves.

Stained Copper Sheet

Q.—We are sending you, under separate cover, a piece of hot rolled copper, which as you will notice is stained. Can you give us any information on the cause of these stains, and the methods of preventing or removing them?

A.—The stains on the copper sheet are "oxidation stains." The contributing cause is moisture. This may come from atmospheric conditions, high humidity. In fact, copper mills find this largely a seasonable trouble and sheets of copper put in stock in good condition have tarnished badly during a sustained period of high humidity.

Another cause of moisture results from the pickling and cleaning operations. If the sheets are not thoroughly dried, after the water bath they will tarnish quickly, and this is further aggravated if any traces of the acid used in the pickling operation is left on the sheet. To prevent copper sheets staining has been the constant study of every copper mill in the country, with as yet poor results.

The outstanding method seems to be the old "hand cleaning process." If carried out carefully in every detail the sheets will resist tarnishing for a long period of time, but it has the drawback of being a slow and rather expensive process. Sheets chemically treated after the pickling and washing operation are giving good results, while the chemicals used are common laboratory knowledge. The mechanical means of applying them in a practical and efficient manner is developed by the mills using this method and is more or less a "shop secret."

Sheets that are stained can be recleaned by immersing in the water tub to which has been added two or more pails of "pickle" from the pickle tub or they can be repickled in the usual way, but if the washing and drying operation is not thoroughly carried out, they will re-tarnish.

A 2 per cent cyanide solution will quickly clean a tarnished sheet, but the same problem of washing and drying properly presents itself. A thorough washing is especially important when cyanide is used, and all traces must be removed from the sheet.—W. J. Pettis.

THE METAL INDUSTRY

With Which Are Incorporated

THE ALUMINUM WORLD, COPPER and BRASS, THE BRASS FOUNDER and FINISHER
THE ELECTRO-PLATERS' REVIEW

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Contents

EDITORIAL

AMERICAN COPPER CONSUMPTION

The consumption of copper in the United States during the last few years has set new records. Due to a desire on the part of the consumer for greater permanency and wearing qualities, due to the expansion of the electrical industries and to the campaign for acquainting the public with the desirable qualities of copper which over-balance, its higher cost, the consumption for normal use (that is non-military demands), has risen from about 900,000,000 pounds in 1921 to 1,466,000,000 pounds in 1922 with an estimated figure of 1,600,000,000 pounds in 1924. According to G. A. Sloan, Secretary of the Copper and Brass Research Association, these increases are largely attributable to a 25 per cent rise in the consumption of copper by the electrical industries and 12½ per cent in building construction (largely roofing and brass pipe plumbing).

The electrical field consumes annually about 50 per cent of the world's copper production. Telephone and telegraph wire, submarine cable, copper and brass in telephone and telegraph instruments take more than 200,000,000 pounds per year. Radio, a new-comer, has already consumed about 5,000,000 pounds of copper. High power transmission wire is another large consumer in the electrical field.

Automobiles in 1923 consumed over 200,000,000 pounds, the various cars using from 20 to 700 pounds of copper and its alloys. A city electric car contains from 1,000 to 2,500 pounds of copper, and the large interurban cars use up to 4,000 pounds. The electrification of railroads, which is proceeding at a rapid rate, is another important consumer.

The building industries using copper roofing, leaders, gutters, flashings and down-spouts, brass piping, hardware, fixtures and electrical devices, account for the 12½ per cent increase mentioned above. In the Grand Central Station of New York, 2,718,000 pounds of copper were used; in the Equitable Building of New York, 2,000,000 pounds. Sheet and rod bars were not specifically mentioned, but it is known that the tonnage of copper used in these forms runs into hundreds of millions of pounds.

Other fields taking much smaller, but nevertheless interesting quantities, are lightnings rods, marine fire fighting apparatus, screening, cash registers, laundry equipment, agricultural machinery, newspaper machinery and dairies.

To a considerable extent the increase in American consumption has helped to compensate for the decrease in exports. There is still a wide margin before this decrease will be entirely made up, but it is to be hoped that the exports will rise to a reasonable level without waiting for American consumption to double itself. A good volume of exports, in addition to the increased sales in the United States, should bring the price of copper back to a good figure.

INDUSTRIAL STANDARDIZATION

According to the new Year Book of the American Engineering Standards Committee, industrial standardization now commands more interest and activity than ever before. The Committee reports that 152 projects have been undertaken, many of which have been completed. Co-operating in these projects are 235 national organizations, representative of technical societies, manufacturers, purchasers and government departments. Fully 1,100 men are now serving on committees.

Non-ferrous metals have accounted for 15 projects covering the following items:

H 1 Zinc and Zinc Ores
Sponsors: American Society for Testing Materials
American Zinc Institute
The definition of grades of spelter; gages and tolerances for sheet zinc; physical tests for sheet zinc; methods of chemical analysis of zinc and zinc ores, and methods of sampling and weighing.

H 2-1921 Electrolytic Copper Wire Bars, Cakes, Slabs, Billets, Ingots and Ingot Bars, Specifications for.
Sponsor: American Society for Testing Materials.

H 3-1921 Lake Copper Wire Bars, Cakes, Slabs, Billets, Ingots and Ingot Bars, Specifications for.
Sponsor: American Society for Testing Materials.

H 4-1921 Copper Wire, Soft or Annealed, Specifications for.
Sponsor: American Society for Testing Materials.

H 6 The Alloy; Copper 88%; Tin 10%; Zinc 2%; Specifications for.
(R4): American Society for Testing Materials.

H 7 Brass Forging Rod, Specifications for.
(R4): American Society for Testing Materials.

H 8 Brass Rod, Free-Cutting for Use in Screw Machines.
(R4): American Society for Testing Materials.

H 9 Brass (Naval) Rods for Structural Purposes, Specifications for.
(R4): American Society for Testing Materials.

H 10 Ingot Metal, Brass, for Sand Castings, Specifications for.
(R4): American Society for Testing Materials.

H 11 Solder Metal, Specifications for.
(R4): American Society for Testing Materials.

H 12 Brass, High Sheet, Specifications for.
(R4): American Society for Testing Materials.

H 13 Plumbago Crucible Sizes.
(R4): The Plumbago Crucible Association.
Standardization of sizes and size numbers of plumbago crucibles for use in casting brass and other non-ferrous metals.

H 14 Copper Wire, Hard-Drawn, Specifications for.
(R4): American Society for Testing Materials.

H 15 Copper Wire, Medium Hard-Drawn, Specifications for.
(R4): American Society for Testing Materials.

H 16 Copper Wire, Tinned Soft or Annealed, for Rubber Insulation.
(R4): American Society for Testing Materials.

A committee is co-operating with Secretary Hoover's Division of Simplified Practice by concentrating upon those projects which involve technical considerations. Through the addition of an engineer translator to its staff, the committee can supply information to its sustaining members, trade and technical associations, and other inquiries on standardization activities in foreign countries. This has been found to be particularly useful to those engaged in foreign trade. More than 140 national trade associations are taking official part under the American Engineering Standards Committee, and the work has been approved by the law through a recent decree of the United States District Court at Columbus, Ohio.

SILVER PRODUCERS' ASSOCIATION

The American Silver Producers' Association has organized at Salt Lake City, Utah, after a conference of the mining and smelting interests. After long hesitation and doubt as to whether such an association could be legal and at the same time perform a useful function for its industry, it was decided in the affirmative. A favorable report by the Federal Trade Commission was reassuring and the strong desire by all the members present to cooperate for mutual protection was undoubtedly the primary cause for the successful consummation of the project.

It was decided not to enter the export field at once, but first to investigate carefully and to consider the problems involved. Plans are to be formulated for financing and beginning educational work to increase the use of silver in industry and the arts.

The primary object of this association is, of course, to increase and stabilize the use of silver, with special reference to orderly marketing, study of world markets and distribution of information about the economical conditions in the industry. It is intended to encourage the use of silver among the foreign nations for coinage and to advertise the use of silver for household and ornamental purposes. It is stated that the silver consumption of the United States is about 30,000,000 ounces per year, whereas if it had kept pace with the growing population and increased wealth of the country, it would have been 72,000,000 ounces per year. The association hopes to bring back silver to its rightful place in the arts and industry.

PROFITS AND LOSSES

A most interesting review of public document "Statistics of Income" issued by the Commissioner of Internal Revenue, is published in the monthly letter of the National City Bank of New York, analyzing the profits and losses of industry in 1921, the latest available collected figures.

On the subject of metal manufacturing, this review states as follows:

METAL MANUFACTURING, INCLUDING IRON AND STEEL

Of 100 corporations engaged in smelting metals from ores or in refining operations, 19 reported profits of $489,787, and the other 81 reported losses aggregating $17,205,099.

Of 2,574 companies manufacturing general or stock products or forms made in foundries and rolling mills, 881 reported profits aggregating $39,284,930, upon which they paid Federal taxes aggregating $5,640,884, leaving a net of $33,644,046, while the remaining 1,693 reported losses aggregating $121,572,283.

Of 1,479 makers of agricultural machinery, steam appliances, construction machinery, etc., grouped together, 554 reported profits aggregating $27,314,460, upon which they paid $4,143,528 in Federal taxes, and the remaining 925 reported losses aggregating $84,307,188.

Including the above, the total number of corporations reporting in the manufacture of all metals, was 15,536, of which 5,468 reported net earnings of $437,366,860, upon which they paid $90,307,720 in Federal taxes, while the remaining 10,068 companies reported losses aggregating $666,001,897.

The above statistics are decidedly gloomy, but certain balancing factors must be bore in mind. In the first place, 1921 was a year of extreme depression and therefore conclusions should not be drawn from it too hastily. In the second place, these figures are taken, of course, from income tax reports and a compilation of these reports is not altogether a true guide to judgment of an industry. A large number of the manufacturing plants reported, were small and in many cases even one-man concerns. In such cases, the question of profits and losses reported is dependent upon the amount allowed for expenses, such as salaries, royalties, etc., and although the owner may be getting a very fair or even excellent income, the corporation may show small profits and in many cases losses.

This condition, however, is also one which should be judged very cautiously, in that it is impossible to determine its extent. The fact does stand out that business as a whole suffered heavy losses in 1921, due to post-war deflation and the above figures do, in a general way, reflect that fact.

AMERICAN FOUNDRYMEN'S ASSOCIATION

The coming convention of the American Foundrymen's Association (advance information of which is published as the leading article in this issue) brings to our attention directly the continued growth and usefulness of this institution. Concrete proof is seen in the high attendance records. When it is remembered that in order to attend the meetings and exhibits, members, manufacturers and exhibitors may travel as much as two thousand miles and also ship exhibits consisting in many cases, of heavy equipment, it becomes obvious that these meetings are financially as well as scientifically worth while. The attendance figures from 1916 to 1923 inclusive are: 2,474; 2,044; 2,357; 2,872; 3,897; 2,470; 3,435. To these figures should be added an estimated 30 per cent to account for those who attended the convention but did not register.

This year's program is unusually interesting and worth while. From advance reports the exhibits should be of a higher order than ever. All forward-looking organizations now realize that their "key" men must be sent to examine the exhibits and find out the advances and changes made in equipment and supplies during the year. It is no longer profitable to cut expense by cutting off or omitting sources of information. Every member of the American Foundrymen's Association and everyone interested in the metal trades should attend this convention.

ROOSEVELT MEDALS OF HONOR

The Roosevelt Memorial Association of No. 1 Madison Avenue, New York, is awarding annually three gold medals for distinguished service to the American people in three out of eight fields of useful endeavor. Two of the fields of particular interest to industry are the numbers classed as 4 and 5, viz.: The promotion of industrial peace and the conservation of natural resources. No medals have as yet been awarded in these particular fields, though six celebrities in the other classifications were awarded gold medals of honor during the years 1923 and 1924. In 1925, there is an opportunity to honor those who have rendered distinguished service in the cause of promoting industrial peace and in conserving our natural resources.

CORRESPONDENCE and DISCUSSION

Although we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein

INSTITUTE OF ELECTRO-PLATING

To the Editor of THE METAL INDUSTRY:

I read with great pleasure the address of Mr. Proctor to the delegates at the convention held in Milwaukee, Wis. I have a suggestion to make regarding the Institute of Electro-plating. It is a very worthy idea and, as you said, "if created shall be taught to the future platers of the United States of America and Canada, and perhaps from other lands far over the sea."

My suggestion is this. Our membership exceeds the 1,000 mark, and it will take from $10,000 to $15,000 per year to run such an institute! We are all very enthusiastic in our work and take great pleasure in everything we do in our profession. Why could not we 1,000 members not be assessed or levied or donate, whichever way you like to put it, $10 or $15 once a year, say October 1st or November 1st, or any date that a committee thinks fit to arrange, and get the thing started? It would be a godsend, and if we did not get our $10 or $15 value out of the Institute in twelve months it would be our fault. Lots of us have sons who are now entering our profession as we entered the profession of our fathers. What a great thing for them and what an opportunity we would be placing in the way of thousands of our sons!

There is no use talking, this thing has to be put over and by us, and us alone. Of course, we know who will get the benefit of such an institute, and by the remarks included in your great address they will come across. But let us get our Institute of Electro-plating started. We can do it, and do it in such a way that none of us will miss the initial cost of starting. I must congratulate Mr. Proctor on his able address, and I hope before very long to have the pleasure of shaking hands with him.

JAMES WELSLEY,
Member Toronto Branch A. E. S.

Stratford, Ontario, Canada, September 11, 1924.

PLATING AUTO BUMPERS

To the Editor of THE METAL INDUSTRY:

I have noticed the article on auto bumpers, by Brother T. C. Eichstaedt, which I will say is very good. However, we all seem to have different ways, and yet get good results. I personally have plated a good many bumpers as follows:

Grind with Lionite

Rough on either	60 or 80
Dry fine on	120
Oil on	150
Color on	150 and flour mixture

Clean in a good cleaner with a double-throw switch, rinse well and copper plate them in a copper solution, such as either of the following:

I.

Sodium cyanide	4 ozs.
Carbonate of copper	6 ozs.
Sodium hydrate	3 ozs.
Water	1 gal.

II.

Sodium cyanide	2 ozs.
Cyanide of copper	4 to 5 ozs.
Sodium hydrate	3 ozs.
Water	1 gal.

Use the above solution hot. They will clean and plate at the same time and ought to give a good heavy deposit. However, should the plater wish for any heavier then, of course, he will have to use an acid copper with plenty of anodes.

The bumper should be buffed, cleaned and nickel-plated. There are a number of different formulæ for nickel solutions in use, some with six or eight ingredients, but when each of the various formulæ are summed up, it gives about the same thing as a double sulphate of nickel and ammonia salt solution. The simple method obviates the numerous difficulties.

If the above is any good to anyone, he is welcome to it.

ANDREW V. RE.

Coldwater, Mich., September 10, 1924.

MIXING MOLDING SAND

To the Editor of THE METAL INDUSTRY:

In reading over your August issue, we could not help but note the problem put up to you with reference to the two pieces of brass castings submitted (Problem 3,265, page 331), and sample of the molding sand used on same.

With reference to the trouble these people are experiencing with their castings, we feel satisfied that it is mostly a mixing proposition and that the addition of coarser sand to their present sand heaps, unless properly blended with the sand, would have very little effect in eliminating their present trouble. We would be willing to wager that their trouble is caused entirely by the non-uniformity of the bond in their sand. While we appreciate that temper might have considerable bearing on this, proper temper is also more readily obtained in a batch mixer where the mulling action thoroughly distributes the temper through the sand. While a lot of stress is usually laid upon the fineness of sand in connection with foundry troubles, we have found that nine times out of ten that it is unequally distributed bond that caused the trouble, rather than the fineness of the sand.

We feel that preparation of the sand in a muller type machine would properly distribute the bond, thus eliminating numerous difficulties experienced with sand.

National Engineering Company
C. D. HOLLINS, Sales Manager.

Chicago, Ill., August 12, 1924.

To the Editor of THE METAL INDUSTRY:

In reference to sand would say I appreciate what Mr. Hollins has to say in reference to mixing sand and would state that I have recommended mixers for handling sand wherever any quantity of sand is handled. Nevertheless, Mr. Hollins will realize that it is necessary in the brass foundry to use different grades of sand for the different classes of work. Where heavy castings and high grade small castings are made in the same foundry, different grades of sand must be kept on hand. The heavy work if made from same sand as light work, will give more or less trouble, no matter how much mixing or grinding is done on the sand.

However, I always recommend that the work should be provided and equipped with conveniences for handling sand, if the quantity justifies the outlay, and in this particular case I still hold that the grade of sand was too fine to allow the gas to escape, owing to the high percentage of zinc used in the mixture. Hence I recommended opening up the sand.

W. J. REARDON.

Detroit, Mich., August 27, 1924.

GOVERNMENT PUBLICATIONS

Secondary Metals in 1923. A report just issued by the Department of the Interior, comprising statistics compiled by J. P. Dunlop, of the U. S. Geological Survey, Washington, D. C., shows that in 1923 about 318,000 tons of the more valuable of the secondary metals—copper, lead, zinc, tin, antimony, aluminum, and nickel were recovered, and more than 515,000 tons of brass and other alloys. The value of the secondary metals was more than $200,000,000. These figures show a heavy increase over those for 1922.

Gold and Silver in 1922. General report, by J. P. Dunlop, U. S. Geological Survey, Washington, D. C.

New Books

The Science of Metals. By Zay Jeffries and Robert S. Archer. Published by McGraw-Hill Book Company, Inc. Size 6 x 9, 460 pages. Price, payable in advance $5. For sale by THE METAL INDUSTRY.

The authors need no introduction to the readers of THE METAL INDUSTRY, being known through numerous publications in the Transactions of the Institute of Metals Division. They state that the book is intended to fill the need for "better classification and more fundamental analysis" of the large amount of data existing on the subject of metals, and their alloys. It consists, therefore, primarily of the exposition of general guiding principles, but it is stated that the material used for illustration purposes is of a distinctly practical nature.

In the introduction a portion of the book covers considerations in the selection of metals and then goes on to explain and define the terms used to describe the mechanical properties of metals, such as "Deformation," "Compressibility," "Young's Modulus," "Poisson's Ratio," "Shear Modulus," etc. Further chapters go into the theory of the structure of metals, grain growth and re-crystallization, mechanical properties, metallic compounds, solid solutions, constitution of alloys, structure and properties of aggregates and some general considerations on the hardness of metals.

For all who are engaged in working with metals, this book will be an invaluable aid in explaining the basic facts underlying the work which they are doing.

Appraisers' and Adjusters' Handbook. By William Arthur Published by the U. P. C. Book Company, Inc. Size 4½ x 7, 616 pages. Price, payable in advance, $5. For sale by THE METAL INDUSTRY.

This handbook is intended for use by engineers, architects, appraisers, adjusters, accountants, etc., in other words, all those who are interested in the value of buildings and equipment. The author has had long experience as an appraiser, and the book is evidently written from the point of view of the practical valuation expert.

Types of equipment covered include buildings of all sorts, such as railroad buildings, engine houses, grain elevators and the author also goes into detail in the matter of the materials which go into building work. He itemizes in separate chapters specific materials used in buildings, such as concrete, stone, brickwork, steel and iron, fireproofing, plaster, woodwork, millwork, glass, sheet metal, hardware, paint, plumbing, heating, electrical work, tiling, and ornamental iron. Useful tables are included showing the variation in prices of different materials, using 1913 as a base, indexed at 100.

Regional Plan of New York and Its Environs. An economic and industrial survey on the metal industry in that locality by V. W. Lanfear, Assistant Professor and Economist, Yale University. Published by the Committee on Regional Plan of New York and Its Environs, 130 E. 22nd street, New York. Price, 75 cents.

This interesting little book outlines the importance of the metal industries of the New York District, the growth and movement of that district; analysis by branches of the metal industry, covering the following divisions:

Group 1. Heavy and Bulky Metal Products:
- General Trends and Their Explanation
- Foundry Work
- Copper Smelting and Refining
- Sheet-Metal Work
- Automobiles
- Aeroplanes
- Shipbuilding and Repairing.

Group 2. Technical Instruments, Supplies, and Fixtures.

Group 3. Light Metal Products, Repairing, and Work of a Service Nature:
- Welding
- Electroplating
- Small Products.

Group 4. Jewelry and Precious Metals.

The reports ends with generalizations and conclusions of the committee showing New York's share of the industry and the principal future distribution in the area covered.

Technical Papers

Nickel and Its Alloys. Circular Number 100 of the Bureau of Standards, Washington, D. C. This circular can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 40 cents.

In this circular the various physical properties of pure and commercial of nickel are described, together with a discussion of the relation of these properties to the composition and treatment of the material. The properties and applications of nickel and its commercially important alloys as Monel metal, nickel steels, ferro-nickels, copper-nickel and chromium-nickel alloys, and other alloys containing nickel are dealth with. Attention is given to those alloys now finding wide industrial applications by reason of their electrical resistance, heat-resisting, and acid-resisting qualities. An extensive bibliography on nickel and its alloys included.

The Preparation of Metallic Tungsten and Some of Its Alloys. By LOUIS KAHLENBERG AND HERMAN H. KAHLENBERG*

Tungstic acid, H_2WO_4, and tungstic acid anhydride, WO_3, are soluble in fused alkali halides, and from such fusions alkali tungstates, metallic tungsten, tungsten bronzes and tungsten alloys may be prepared. When WO_3 is added to fused sodium chloride, chlorine is liberated and a compound $Na_2O.W_2O_5$ is formed, which dissolves in the excess of NaCl present. When H_2WO_4 is added to fused NaCl, HCl is liberated and alkali tungstates are formed. It requires prolonged heating to expel the last traces of HCl from such fusions. A smooth deposit of exceedingly pure and very ductile metallic tungsten was obtained from the proper fusions by electrolysis, using low current densities and low voltages. At higher current densities, the metal separates out in granular or pulverulent form. From fusions very rich in tungsten, tungsten bronzes are deposited on the cathode. This is a new method of preparing such bronzes. Tungsten was also prepared from the fusions by chemical displacement with other metals. According to these replacement experiments, the position of tungsten in the electrochemical series lies beween zinc and iron. Various tungsten alloys were prepared by new methods.

*A paper presented at the Forty-sixth General Meeting of the Amercian Electrochemical Society, held in Detroit, Mich., October 2, 3 and 4, 1924.

The Preparation of Pure Alloys Including a Preliminary Study of Certain Electrical Properties of the System Aluminum-Magnesium. By ROBERT FRANKLIN MEHL*

The accuracy of metallographic data is discussed with particular reference to the effect of impurities upon electrical measurements. Sources of contamination are pointed out, and the various methods are discussed by means of which contamination has heretofore been avoided. The preparation of pure basic oxide crucibles is discussed and a new method of making pure magnesia crucibles of high strength and density, for use up to 1,200° C., is given. A combined furnace and casting apparatus is described for the preparation of very pure alloys in a form suitable for the measurement of electrical properties. Methods for the measurement of the thermo-electromotive force and the temperature co-efficient of resistance of aluminum-magnesium alloys are given. The results of preliminary measurements of the temperature co-efficient of resistance and of the thermo-electromotive force and its temperature co-efficient, upon certain compositions of the system Al-Mg, are presented.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ANTIMONIAL LEAD

Q.—Under separate cover we are mailing you sample of our automobile flower vase holder which we have been making. This casting was made on a new die casting machine which we have just completed. The metal is 87 per cent lead and 13 per cent antimony but it is too brittle. We have tried various combinations but do not seem to get the proper mixture.

Our many years experience in antimonial lead for making of our main line of salt and pepper shaker tops has not required the use of other alloys. We are expanding our field and this vase holder is a new item but we realize requires a more flexible metal and wish your suggestions. We realize there are many new kinds of soft metal being put on the market but we are not familiar with their functions.

Our machine has been built for lead base metal. After much experimenting we have been able to produce very satisfactory castings but still have trouble with air pockets which we believe we will overcome to a satisfactory extent. We believe the adding of tin would reduce the brittleness but we are not sure of the proportion.

A.—We have inspected the sample casting furnished and suggest you try a mixture of 80 per cent lead, 10 per cent antimony, 10 per cent tin. We take it you want a lead base metal and we feel for the class of work similar to sample furnished this mixture will meet your requirements.

Another good mixture is composed of 78 per cent lead, 8 per cent tin, 14 per cent antimony. This metal is strong and tough and runs well, gives a nice finish and should be cast at a low temperature.—W. J. R., Problem 3,275.

BRASS PLATING SCREWS

Q.—Enclosed you will find two iron screws brass plated in mechanical plater. I do hundreds of gross of this work but lately results have been unsatisfactory. You will note the pale brass on one and the bronze color on other screw, and both were plated in same batch, in carbonate solution, and used cold. Heating makes very little improvement.

Our cast copper anodes become covered with a loose bluish-green slime, easily rubbed off with brush but this takes a lot of time, also carbonate solution.

I inadvertently added carbonate of soda to brass solution and anodes turned dark gray very quickly, necessitating an acid dip. Did the addition of sal soda cause this? How may I remedy it, and also uneven color of plated screws? This uneven color was there before adding the soda.

A.—Your trouble may be due to several causes, primarily deficiency in cyanide and a reducing factor, then again the metal may be low in solution. Carbonate of soda does but little good in a brass or copper, or bronze solution other than it helps conductivity or throwing power.

To overcome your present trouble, we suggest you proceed as follows:

1. Add 2 ozs. bisulphite of soda to each gallon of solution. This addition will give a better anode corrosion resulting with more metal in solution.

2. After making the above addition, add from 1 to 2 ounces sodium cyanide per gallon. Go slowly after you have added the first oz. If you should add an excess of cyanide it would result in no deposit of metal, but of course, this would easily be remedied by the addition of a little metal to take up the free cyanide. After you have made the additions as noted, if your brass color is not uniform, then add 1 pound of carbonate of zinc to 1 quart of ammonia, 26 per cent. Stir thoroughly, add a small amount of the zinc and ammonia solution at a time until your solution produces a normal brass color. Why do you use carbonates of the metals? The cyanides of the metals are more efficient and cause less trouble, and they only require about half the amount of cyanide to put an equivalent of metal in solution based upon 50 per cent metal in the carbonates.

One pound of copper cyanide 70 per cent metal can readily be put in solution with 1 pound of sodium cyanide, 96-98 per cent.

The sodium cyanide should always be dissolved in hot water before adding the copper cyanide. It requires 1¼ pounds of sodium cyanide to put 1 pound of copper carbonate in solution that only contains 50 per cent metal. You can easily figure out the difference in costs of the two methods.—C. H. P., Problem 3,276.

COLORING BRASS BY ACID DIP

Q.—I am enclosing herewith a small sample of colored brass of which I wish to know how the surface color is produced. The brass itself is of 67:33 mixture, but the surface color is not the natural color of the metal. You will notice, also, that a kind of matte finish has been given to the brass. I believe this has been produced on specially roughened rolls. From tests I have made I do not think the color is due to lacquer as I find no evidence of same.

A.—From experiments we have made with the small sample of sheet brass you have submitted to us to know how the surface is colored, we have come to the conclusion that the finish results from an unusually good bright acid dip.

The bright finish is slightly tarnished, giving the brass almost the appearance of having been gilded by immersion in a gold dip. The slight tarnish, however, was removed by immersing the sample in a dilute sodium cyanide and water dip. The very light matte or satin appearance results from the acid dipping. The following methods would in our opinion produce similar results.

1. Cleanse the articles in a regular hot alkaline cleaner.
2. Wash in cold water.
3. Immerse for a moment in an undiluted nitric acid dip to which a small amount of soot is added ¼ to ½ oz. per gallon of acid.
4. Wash in water again, then immerse in the cleaner for a moment or two.
5. Remove and drain thoroughly. Do not wash in water.
6. Immerse in the following acid dip which should be prepared some time previously so that the acids will be cooled down to the normal temperature.

Nitric acid, 38°	1 gallon
Sulphuric acid, 66°	1 gallon
Water	1 quart
Muriatic acid	2 ozs.

After this final dip, wash thoroughly in cold and boiling waters, and dry out in maple wood sawdust. By immersing the acid dipped brass in a solution consisting of

Water	1 gallon
Hyposulphite of soda	2 ozs.
Lead acetate	2 ozs.

at 180° F. for 5 seconds, a pale gold tone results. Wash and dry out thoroughly afterwards. In our estimation, however, the finish is nothing more than a bright acid dipped finish.—C. H. P., Problem 3,277.

DROSSY BRASS CASTINGS

Q.—We are having some trouble with our metal these days and I am enclosing herewith for your inspection a couple of samples of metal which have failed. If you can throw any

light on the cause and can help us in any way to eliminate our difficulty your assistance will surely be greatly appreciated. I might mention that we melt our metal in coke pit furnace.

A.—On examination of your sample furnished, we find the metal to be very drossy and believe your difficulty is in your mixture. We suggest for this class of work a mixture 58½ copper, 41 zinc, ½ aluminum.

Melt your copper first; get good and hot, add the zinc a little at a time and stir well and then add the aluminum. If this mixture is too high in price and you wish to use scrap, we suggest a mixture of sheet yellow brass and add ½ per cent aluminum as a flux. At any rate we find your trouble to be due to your mixture of metal, for your class of work, as the metal contains considerable dross, which causes your metal to become very weak.—W. J. R., Problem 3,278.

HIGH LEAD MIXTURE

Q.—At the present time we are making bearings, composition of same being 73.05 copper, 5.275 tin, 21.225 lead. We use only a good grade of copper, virgin lead and straight tin, using sulphur in addition so that the alloy would retain the lead.

The castings look very good but on machining same they seem to be rather porous. The majority of these bearings are half bearings, which are cast with the wearing surface down, while some of them are solid brasses with the core through same, although there is no agitation off the cores, yet on machining same the metal seems to be rather porous after taking off approximately 1/16 of an inch. If you could give us any suggestions to remedy this, same would be greatly appreciated. Could you advise us where to secure galena ore?

A.—In reference to galena ore: this material can be purchased from the American Zinc, Lead & Smelting Company, St. Louis, Mo. We do not, however, recommend the use of galena ore where tin is present.

We suggest in your mixture of 73.05 copper; 5.275 tin; 21.225 lead, that you try 1 per cent of 30 per cent manganese copper, using the manganese copper in place of the sulphur, as sulphur is never desirable where tin is present in over ½ of 1 per cent. Galena ore is a sulphide ore.—W. J. R., Problem 3,279.

LINING FOR PLATING TANK

Q.—Will you kindly inform us whether or not it would be satisfactory to use a galvanized tank for nickel and cyanide copper solution. The tanks referred to are new, made of heavy sheet galvanized steel. We had in mind that perhaps we could use them for the purpose mentioned if we covered them with a heavy coat of asphaltum.

A.—It is not good practice to use tanks made from steel that have been hot galvanized for either nickel or copper solutions. We suggest that to insure a heavy coat of asphaltum that will adhere to the tank, you follow these suggestions:

Soft solder, regular iron wire chicken-coop, that has been galvanized (square mesh) to the inside of the tank; (sides and ends—the bottom of the tank will not require it).

When all is ready, lay the tank on one side. Be sure it is even. Fasten a strip of wood the entire length to regulate the thickness of the flow of the molten asphaltum ¼ or ½ inch thick. Cover the wire mesh to a sufficient depth with the molten asphaltum so that the results will be a solid wall of reinforced asphaltum. Treat the remaining side and the ends the same. The bottom should be covered to the depth of ½ inch. The method outlined will insure a satisfactory lining for the tank without any possible detrimental results to the solutions.—C. H. P., problem 3,280.

LOCOMOTIVE BRASSES

Q.—We are using a bronze for our locomotive rod brasses and bushings, composition approximately 80 per cent copper, 10 per cent tin, 10 per cent lead, and permit the use of virgin metals only. The question comes up as to whether or not we should permit the foundry to use in these virgin metal castings, gates, risers, etc., incident to their manufacture.

A.—In our opinion you would be perfectly safe in using the gates and risers from the above mixture. The second melt of this alloy gives a more homogeneous alloy than the first. By adding the gates and risers to the new mixture should improve the alloy. However, we would not recommend any other metal to be added outside of the gates and risers from the castings.—W. J. R., Problem 3,281.

POLISHING ALUMINUM STAMPINGS

Q.—We are making aluminum stampings like the stamping enclosed, and are trying to burnish them or polish them in a burnishing barrel. We are using steel balls of ⅛ in. diameter, but we seem unable to get the aluminum stampings out bright enough, and we have tried soap bark, whale oil soap and Palm Olive soap chips.

The writer has the impression that we want a mild alkali like a diluted borax solution. We have been running the barrel at 40 r. p. m. also 60 r. p. m.

A.—Try a mixture of boric acid and borax, basis 2 ozs. to each gallon of water. Soap solution cannot be used.—C. H. P., Problem 3,282.

REFINISHING BRASS BEDS

Q.—(1) Please give us the best method of refinishing brass beds and lacquering, to a satin finish.

(2) After taking from the hot water to be lacquered our work tarnishes. Could you give us a method to prevent this oxidization?

A.—The removal of the old lacquer and refinishing in satin finish should be done in one operation. To accomplish this, mix coarse emery with a thick oil. Apply to a good heavy cloth and rub the bedstead parts down evenly with a backward and forward motion. As soon as the surface desired is produced, remove the excess of oil with cotton waste, then go over with cotton waste moistened with gasoline; wipe dry and lacquer direct.

By using this method, you are always assured of an even satin finished surface without oxidation. Another method is to remove the lacquer with wood alcohol or by immersing in hot cleaning solutions. Wash and dry the bed parts out thoroughly afterwards. Rub them down with coarse steel wool without oil. Canvas gloves should be used on the hands to prevent the steel wool abraiding the skin. No washing with gasoline is required. The lacquering can be done at once as soon as the rubbing down with the steel wool is completed.—C. H. P., Problem 3,283.

STRIP NICKEL FROM COPPER

Q.—We are writing to ask if you can give us a formula that will take nickel plating off copper.

A.—You can use either of the following methods in stripping nickel from sheet copper.

Acid Strip:

Sulphuric Acid, 66°	3 quarts
Nitric Acid, 38%	1 quart
Water	1 pint

Keep the solution cool when in use; if the copper becomes too rough after the nickel has been removed, then increase the sulphuric acid to 3½ to 4 quarts. Do not add any water after the first addition.

Electro Strip:

Prepare a solution as follows:

Sulphuric Acid	1 gallon
Water	1 pint
Glycerin	1 oz.

Arrange as you would for an electrotyping solution. The current, however, must be just the **reverse**; the copper to be stripped becomes the **anode**. Surround the tank with either sheet lead or sheet copper which becomes the cathode. The use of a large cathode surface insures a uniform, rapid reduction of the nickel from the copper.

Use about 4 to 5 volts. Do not add any water to the strip after the first addition. It will absorb more from the atmosphere.—C. H. P., Problem 3,284.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,502,857. July 29, 1924. **Process for Treating Copper and the Product Thereof.** Susan B. Leiter, Schenectady, N. Y., assignor to General Electric Company, a Corporation of New York.

The process of rendering copper containing oxygen immune to the embrittling effect of reducing gas, which consists in segregating the oxide located between the boundaries of the grains of said copper into globules distributed throughout the mass thereof.

1,503,443. July 29, 1924. **Process and Material for Preparing Metal for Coating.** James H. Gravell, Elkins Park, Pa.

The method of cleaning metal consisting in subjecting it to the action of an alkali metal compound in the presence of an alcohol which boils at a higher temperature than ethyl alcohol

A composition of matter for cleaning surfaces consisting of an admixture containing hydroxyl ions and an alcohol which boils at a higher temperature than ethyl alcohol.

1,504,206. August 12, 1924. **Process of and Means for Nickel Plating.** Edwin M. Baker, Ann Arbor, Mich., assignor to Christian Girl, Kalamazoo, Mich.

The process of nickel-plating articles which comprises the following steps:

(a) Subjecting the articles to an electro-plating treatment, employing therein anodes of substantially pure nickel, a current density of approximately 100 amperes per square foot of metal treated, and a bath heated to about 85° C. and containing the following ingredients, in substantially the proportions stated, per gallon of solution:

32 oz. nickel sulphate ($NiSO_4.7H_2O$)

3.3 oz. nickel chloride ($NiCl_2.6H_2O$)

2 oz. boric acid (H_3BO_3).

(b) Subjecting the said articles to a copper-plating treatment in a bath agitated with air and at a temperature of approximately 30° C., said bath containing the following ingredients in approximately the proportions stated per gallon:

28 oz. of copper sulphate ($CuSO_4.5H_2$)

11 oz. of sulphuric acid (H_2SO_4).

(c) Nickel-plating the articles in substantially the same manner and in a bath of the same character as set forth in step (a) hereinbefore.

1,504,207. August 12, 1924. **Method of Determining Boric Acid in Nickel-Containing Solutions.** Edwin M. Baker, Ann Arbor, Mich., assignor to Christian Girl, Kalamazoo, Mich.

A mixture of bromo-cresol purple with bromo-thymol blue in proportions suitable to form an indicator capable of undergoing a sharp change in color immediately upon neutralization by a standard alkali of the boric acid in a nickel-containing solution.

1,504,272. August 12, 1924. **Buffing Wheel.** Charles P. Schlegel, Rochester, N. Y.

A circular one-piece woven fabric buffing wheel in which all of the weft threads are arranged radially in the same plane and the warp threads circularly.

1,504,298. August 12, 1924. **Process of Rustproofing by Coating with Cadmium.** William A. Wissler and Chad H. Humphries, Kokomo, Ind., assignors to The Udylite Process Company, Kokomo, Ind.

The method of rustproofing iron or steel articles by electrodepositing thereon, metallic cadmium from a suitable cadmium solution, which method consists in passing a current, maintained at high current densities, through said solution from a graphite, carbon or non-polarizing anode.

1,504,338. August 12, 1924. **Alloy Comprising Iron, Nickel, Chromium, Tungsten, or Molybdenum.** Pierre Girin, Paris, France, assignor to Societe Anonyme de Commentry, Fourchambault & Decazeville, Paris, France.

A high nickel ferrous alloy containing nickel, 60 to 70 per cent, chromium, 10 to 15 per cent, tungsten, 2 to 5 per cent, manganese, 1 to 2 per cent and carbon, 0.3 to 0.6 per cent, such alloy having at elevated temperatures great mechanical resistance and also great resistance to chemical agents and susceptible of retaining indefinitely its initial properties, notwithstanding prolonged service.

1,504,697. August 12, 1924. **Abrasive Compound.** Joseph A. Menard, Seattle, Wash.

An abrasive compound for grinding in bearings and finishing bearing surfaces containing lead, silica and sodium in substantially the proportions stated.

1,504,700. August 12, 1924. **Electroplating-Apparatus.** José Luis Mujica, Brooklyn, N. Y., assignor to U. S. Galvanizing & Plating Equipment Corporation, a Corporation of West Virginia.

In apparatus for liquid treatment of articles, the combination with a tank, of endless means for supporting and moving the articles around the tank, and means for supporting said conveying means from the tank comprising a series of cross members and an adjustable connection permitting the length of said article supporting end conveying means to be varied.

1,505,082. August 19, 1924. **Process and Backing for Use in Lead Molding for Electrotypes.** Harry M. Blaetz, Philadelphia, Pa.

The process of lead molding which consists in simultaneously pressing the entire surface of a lead sheet placed between the original and a plastic backing, thereby distributing the backing locally as the pressure is applied and equalizing the reactive pressure of the backing over all parts of the lead.

1,505,109. August 19, 1924. **Process for Electrodepositing Lead Upon Iron.** Bertrand S. Summers, Port Huron, Mich.

A process of electro-plating lead on iron which consists in forming a solution of lead, immersing the iron to be treated therein, immersing aluminum anodes therein and connecting the anodes and the iron cathodes with a suitable source of direct current.

1,505,424. August 19, 1924. **Electroplating Apparatus.** Forrest G. Purinton, Waterbury, Conn.

In an electroplating apparatus, a plating tank adapted to contain a plating solution, a rotary plating barrel adapted to contain a mass of small articles to be plated, said barrel being mounted on a shaft, an arm pivoted to said shaft, said arm being pivoted on said tank, and means for rocking said arm about its axis to raise the plating barrel out of the plating tank.

1,505,495. August 19, 1924. **Smelting Apparatus.** Richard Rodrian, New York, N. Y., assignor to Rodrian Electro-Metallurgical Company, Incorporated, a Corporation of Delaware.

A furnace for the reduction of metal comprising a smelting chamber, the inner surface of which is of non-conducting material, means to bring a charge of metal placed within said chamber to a molten condition comprising a plurality of downwardly directed nozzles passing through said inner surface, and means to treat electrolytically the molten metal within said chamber comprising a plate of electrically conducting material set into the bottom of said smelting chamber and an electrode extending downwardly into said chamber substantially in alignment with and spaced from said conducting plate.

1,505,724. August, 1924. **Method of Molding.** William H. Nichols, Wilkinsburg, Pa.

The method of making a mold that comprises placing a pattern in a flask, laying a separate elongated pattern member upon said first-named pattern, filling said flask with sand, inverting said flask, removing said first-named pattern, and withdrawing said elongated pattern member by first moving elongated member lengthwise horizontally, and then lifting said member through the space left by said first-named pattern.

1,506,281. August 26, 1924. **Electric Furnace.** Thaddeus F. Baily, Alliance, Ohio.

In an electric furnace having a heating chamber and a hearth therein, a rib upon the walls of the heating chamber, above the hearth, and an arched resistance trough supported upon said rib and in juxtaposition to the walls of the heating chamber.

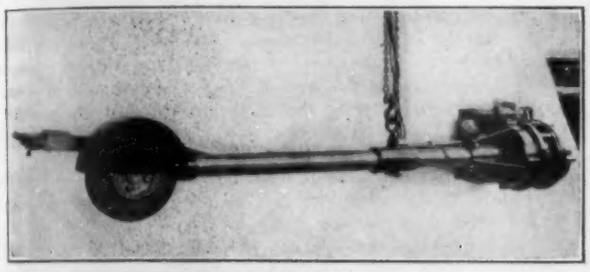
EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

MOTOR DRIVEN SWING FRAME GRINDER

Having long felt the need of a real direct connected motor driven swing frame grinding machine, the Diamond Machine Company of Providence, R. I., have now placed on the market such a line of grinders. The cut shows the machine with the motor an integral part of it.

Two sizes are built for any current characteristics except 25 cycle in which case only one size may be obtained. For standard current one size has a 12 x 2" grinding wheel, driven by 3 hp., 1,800 r. p m. motor, the other has an 18 x 4" grinding wheel, driven by 5 hp., 1,200 r. p. m. motor and for 25 cycle current the machine has 14 x 2" wheel with 3 hp., 1,500 r. p. m. motor.



DIAMOND SWING FRAME GRINDER

The old belt driven type were most inconvenient to use in foundry and railroad shops because of the high head room necessitating longer supports and belt centers. Such motor driven outfits as were available had the motor fastened in overhead frame work, thus requiring belts that limit the area that the grinder could cover.

Instead of these old type cumbersome ceiling supports, a standard 8' chain hoist holding the machine at its center of gravity is furnished. This feature allows the machine to be readily raised or lowered as the grinding may necessitate. This support is so nicely balanced that none of the operator's strength is taken in moving or swinging the machine. This feature enables the machine to be hung from a hook in the ceiling or a light jib crane which could swing the grinder over a wide area.

The motor is carried on a special end piece rigidly fastened to the hollow arm in which the driving shaft revolves. At the wheel head end there is a set of nickel steel spiral bevel gears for driving the wheel. These gears are fully enclosed and are run in oil. The machine is ball-bearing throughout. These bearings are of ample capacity, and are in dust proof housings.

One of the most important features of this machine is the easy accessibility of the wheel, which can be removed by taking off side plate on safety guard and wheel flange. It is unneccessary to remove the spindle or expose the bearings, thus eliminating the possibility of getting dirt into them. For this reason the readjustment of bearings is not required, which is in marked contrast to the frequent adjustments necessary in the older type of machine.

The ball bearings have a guaranteed life of five years. The gears are said to be practically indestructible. The wheel head swivels so that the wheel may be rotated 90 degrees each side of the vertical position, independent of the rest of the machine. It can also be fastened at any angle. The operator's handle is adjustable and can be fastened in any desired position from a horizontal position upward to a 45 degree angle.

The guard is built to meet the specifications of the American Engineering Standards Committee, which have been accepted as standard by departments of labor of many States and by leading industries.

Not the least interesting feature is the electrical control. The motor is operated by push button control attached to the operator's handle within fingers reach so that the machine may be started or stopped by the operator as he stands at his work position. The starter is fastened directly to the motor.

The machine is furnished ready to run, the only requirements are an overhead hook or eye bolt from which to suspend a flexible cable, bringing the electric service to the desired location, connecting the power leads and pushing the button.

STAMPING OPERATIONS REQUIRING SPECIALIZED TREATMENT

A problem encounted in designing many new stamping operations concerns the question of whether to draw or form the metal. In the latter case, the metal is compressed into the shape desired. In drawing, however, the metal is pulled or made to flow into the desired form. The ingenuity or lack of ingenuity exercised by the die-maker in analizing conditions of operation is more often the cause for success or non-success of a new die than any other one factor.

The motor support arm shown here and used on the accompanying Buffalo Breezo fan illustrates a case in proof of the above. To stamp this arm, which is "U" shaped to obtain rigidity, the supposition is that a forming operation would attain best results; in other words to form the "U" from the flat piece of steel and then curve the arm. The difficulty in employing a forming operation, here, however, is that two directly opposing forces are exerted on the part being curved. The outer circumference of the arm is drawn while the inner circumference is subjected to a forming action. The exerting of these two opposing forces results in a buckling of the sides of the arm, particularly around the inner circumference of the arc. This condition is undesirable; it greatly weakens the structure of the support and in addition, mars the appearance.

The method of stamping developed by the Buffalo Forge Company, of 490 Broadway, Buffalo, N. Y., and used in this instance, consists of a drawing operation throughout. The piece of metal, after being blanked, is formed up in the flat; that is, it is pressed to the proper curvature. The pressure

BUFFALO BREEZO FAN

plate, holding the ends of the sheet metal, moves downward and stretches the metal over the forming punch. The result, at the finish of the stroke is the "U" shaped motor support arm shown here. This arm is exceptionally rigid, practically unbreakable under conditions of service demanded here and so formed that it offers the minimum resistance to air passage. A pair of ears at each end of the arm provide the method of attachment to the motor and the fan frame. (See illustration alongside.)

The entire fan unit is made of pressed metal including the blades and frame. A complete line of these fans have been developed. The outstanding characteristics claimed are lightness, quiet operation, and neat appearance. The motors are totally enclosed, equipped with thrust plugs and waste packed bearings which require oiling only once every season.

BREEZO FAN ARM

History of Phono-Electric Wire

By CLARENCE L. HANCOCK

In the early days of street car service most urban transportation was supplied by horse cars, and there is still a considerable question as to whether Denver, Colorado, or Richmond, Virginia, deserve the credit for first abandoning horse cars in favor of electric cars. At any rate, there was still a considerable quantity of 1/0 copper wire in service from the original installation at Denver up to two years ago and all city lines are still narrow gauge, while the later lines elsewhere use what is known as standard gauge or the same as is used by steam roads.

Soon after electric operation was started it became evident that for certain sections of large street railways copper trolley wire did not have satisfactory wearing qualities. The necessity for frequent renewals demanded some material which would provide satisfactory conductivity and at the same time guarantee a considerably longer life. In 1889 Frank J. Sprague, the well known engineer and pioneer builder of railroads employing the overhead trolley method, installed a system in Richmond, Virginia.

Mr. Sprague had a great deal of trouble in securing a satisfactory wire for the overhead contact line as the copper wire available at that time was entirely unsatisfactory.

In some way the difficulties being experienced were brought to the attention of the gentlemen who were at that time organizing the Aluminum Brass and Bronze Company, which occupied the property now covered by the Bridgeport Brass rolling mill at Housatonic avenue.

That company developed a wire for the purpose which was so satisfactory that Mr. Sprague specified it for all of the railroads whch were thereafter built under his supervision.

The wire was a combination or alloy wire made of approximately 98¾ per cent copper and 1¼ per cent of tin and was fabricated and found to provide a conductivity of nearly 45 per cent of that of copper wire and fully 50 per cent more tensile strength for any given size. Its wearing qualities were from two to four times the effective life of ordinary hard drawn copper wire. It was also found that this bronze alloy was considerably tougher than copper and for this reason with-

The Aluminum, Brass and Bronze Company, however, met stood more satisfactorily the abuse to which trolley wire was subjected in the early days when erection crews and maintenance men were much less skilled in their work than today and most materials were installed by the crudest of methods. with financial difficulties in 1892 so that for a time production of the material ceased.

F. J. Kingsbury, who had previously been secretary of the Aluminum Brass and Bronze Company, came with the Bridgeport Brass Company in 1895 and immediately proceeded to exploit the wire as a part of the product of the Bridgeport Brass Company. The name "Phono-Electric" Wire was given to it because at the time of its development the telephone was becoming more widely known and it was believed that the new wire would fill a need in this field permitting a longer span in erection due to its greater strength. As the result of continued study and experimentation, the quality of the material was from time to time improved.

After heavy traction electrification began in this country and both copper trolley wire and steel trolley wire had proven unsatisfactory, Phono-Electric was selected as the standard contact wire by the New York, New Haven & Hartford Railway Company and then was later adopted by the Norfolk & Western Railway Company, Pennsylvania Railway and Boston & Maine lines, which all proceeded with their electrification work within a few years of each other.

INSTALLATION AND TROUBLE SERVICE

A new and interesting type of service has been instituted by the Modern Engineering Company, 318 Broadway, New York. This concern, which has specialized for a number of years in the design of automatic, labor-saving machinery, has added an Installation and Trouble Department, doing the work of installation and acting as "Trouble Man" in New York for manufacturers of standard enquipment who have no representatives in that district.

This arrangement is highly advantageous in that it saves the expense and trouble of sending out a man for a limited amount of work. Little difficulties which so often arise when putting a new machine into operation can be corrected without delay, and with a minimum of expense to both buyer and seller of the equipment. In this way a good, quick local service can be obtained at minimum cost.

NEW POLISHING OR GRINDING LATHES

The Newman Manufacturing Company, of Cincinnati, Ohio, has placed on the market a new grinding or polishing lathe for extra heavy pieces, called the Newmanco Swing-Lathe. It is utilized for grinding or polishing sheets, tubing, bars, etc., too large for conveniently working by hand. It is claimed that it will grind and clean rough castings of any kind, shape or size, and it is specially recommended for cleaning, preparatory to enameling.

The swing-lathe is full universal, and can be swung in a 90-degree arc. The polishing head can be swung 90 degrees in a vertical direction. It is driven by a 4" flat belt which it is stated will positively stay on at all times. It has capacity to take on 14" buffing wheel or a 12" grinding or emery wheel. It is equipped with the regulation exhaust and hood. All handles are permanently affixed in order to give the operator complete control of the device. The spindle is of high carbon steel 1 7/16" in diameter, and runs in high grade babbitt bearings. The pulley is 5" in diameter and carries a 4" belt.

WASH FOR METAL MOLDS

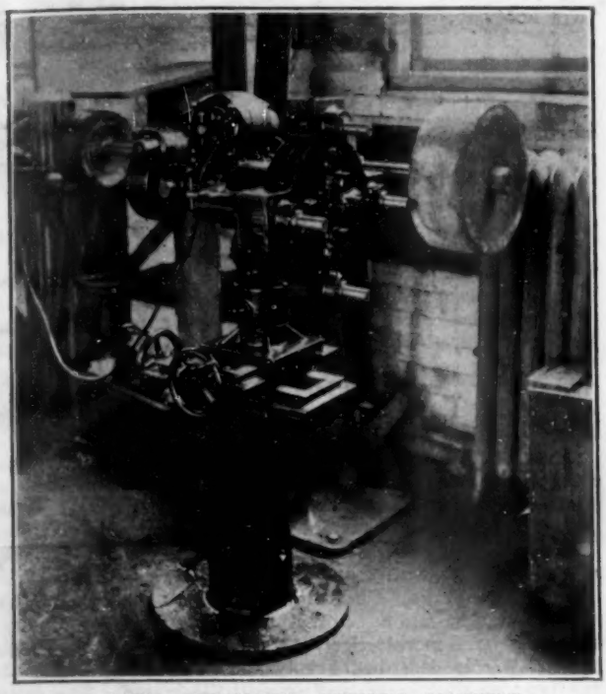
R. E. Byrd, of Erie, Pa., is marketing a new compound called Die-Kote to apply to metal molds for die casting, hand pouring or babbitting. Die-Kote is a red powder mixed with water to a thin consistency, and applied with a fine camel's hair brush while the dies are hot enough to make the water sizzle. The water will steam off leaving a thin film of the material on the die and it is claimed that this will facilitate the manufacture of smooth, clean castings in metal molds.

It is stated that the dies must be free from oil or grease before this material is applied. It is sold in 5-pound cans or 25-pound bags.

AUTOMATIC BUFFING MACHINE

Below is an illustration of a new type of automatic buffing machine the Acme Manufacturing Company, 1645 Howard street, Detroit, Mich., has recently brought out.

This machine is intended where production is such that long runs on the same piece are the rule, or where there are various pieces in fairly large quantities, although the machine can be set and reset very readily. The important feature of the machine is that the time the work revolves against the wheel is



ACME AUTOMATIC BUFFING MACHINE

predetermined and the head is tripped to the next piece automatically. For instance, the time can be set so that the head will trip every 10, 12, 15 or 20 seconds, or equivalents of these figures by setting the sliding key in the desired gear ratio. This machine is the four-spindle type "G" and as is the case with the other Acme types, the head can be set at any angle to the wheel for various shaped work. It is self-contained, driven by motor, mounted on top of machine, eliminating all overhead arrangements.

The machine is automatic in operation and all the operator does is to load and unload spindles as they go by the loading station. Work up to 5 inch in diameter can be handled. Method of holding work is by chucks of the expander type to suit the piece.

GYRATORY FOUNDRY RIDDLE

The Newman Manufacturing Company of Cincinnati, Ohio, has placed on the market a gyratory foundry riddle for riddling molding sand. The frame is constructed of steel tubing with the riddle frame of cast steel. The machine is gear-driven by a ⅓ h.p. motor of standard make, either A.C. or D.C. The height of the riddle is adjustable according to the height of the ceiling, it is portable and light in weight. It is claimed that this riddle will sift as fast as two men can shovel sand into it, and will keep at least 20 men supplied with sand; also that it mixes the sand while sifting, thus saving one turning.

LINK-BELT'S EXHIBIT

What promises to be one of the interesting exhibits at the forthcoming Foundrymen's Convention to be held in Milwaukee, October 11 to 16, 1924, is that of the Link-Belt Company. Their exhibit occupies spaces 262 and 263, and in them there will be exhibited the Rapp Revivifier, also a Link-Belt electric hoist will be put into actual operation at this exhibit. Various types of Link-Belt chain, together with interesting photographs, will be used as exhibition material. A. G. J. Rapp, engineer from the Chicago plant, will be in charge of the exhibit.

NATIONAL EXHIBIT

The National Engineering Company, 549 West Washington Boulevard, Chicago, will have the usual complete exhibit at the American Foundrymen's Convention to be held in Milwaukee, October 11-16, 1924, showing two different sizes of the well-known Simpson sand mixer, for the preparation of all kinds of sands in foundries producing steel, gray iron, malleable, brass and aluminum castings. The No. 2 6-inch diameter Simpson mixer will be in actual operation. They will also show their largest size, the No. 3 8-inch diameter Simpson mixer. In addition, they will exhibit the Newaygo sand machine, used for aerating foundry sands. Representatives present will include: H. S. Simpson, president; C. D. Hollins, sales manager; B. Castor, master mechanic; C. J. Skeffington, Detroit representative; H. N. Schreuder, Eastern sales representative; G. C. Richards, Pittsburgh representative.

MONARCH EXHIBIT

The exhibit of the Monarch Engineering and Manufacturing Company of Baltimore, Md., at the convention of the American Foundrymen's Association in Milwaukee, October 11-16, 1924, will consist of the following:

1 No. 92 Simplex tilting furnace with rocking device.

1 No. 125 tilting crucible furnace, oil or gas.

1 No. 45 stationary crucible furnace, oil or gas.

1 250-lb. stationary iron pot furnace, soft metal, oil or gas.

1 300-lb. stationary iron pot, soft metal furnace, bottom pour, oil or gas.

1 small size tilting or stationary iron foundry cupolette.

1 combination core oven.

1 Blizzard sand mixer.

1 combination positive pressure blower and motor with oil pump.

1 No. ½ double chamber furnace, tilting, oil or gas.

1 combination double ladle heater.

1 bottom pour, patent monometer, white metal furnace, for journal bearings, or foundry use.

1 continuous motor-driven revolving furnace for melting or smelting.

They will be in the arena, main floor, spaces 215 and 216.

NEW PAPER PULLEY

The Best Pulley Manufacturing Company, 400 Talcott avenue, St. Louis, Missouri, has just announced a new line of paper pulleys, claimed to be of unusual interest to users who are looking for pulleys which will reduce belt slippage, require less belt tension, and give better power transmission.

Best paper pulleys are made of carefully selected, special treated paper fibre, hydraulically compressed into a solid block. The end grain of the fibre is exposed to the belt and grips without slippage. A special feature is a new patented double locking hub which has three sets of two ribs each which grip into the paper and absolutely prevent the hub from coming loose, even thought the pulley may be reversed in direction. These ribs are a part of the hub and extend out from the hub in a V shape so that when the hub is hydraulically pressed into the pulley it becomes an integral part of the pulley itself.

These pulleys are made in 2,500 stock sizes and the manufacturer states that orders can be filled the day received. The Best Pulley Manufacturing Company also make spur and bevel paper frictions.

EQUIPMENT AND SUPPLY CATALOGUES

Electric Furnace Brass—Sample brass tacks have been sent out by the Bridgeport Brass Company, Bridgeport, Conn.

Porous Plates—A booklet issued by the Norton Company, Worcester, Mass., on its porous plates used for filtering medium.

Monorail Installations—A folder issued by the Louden Machinery Company, Fairfield, Iowa, telling where Louden Monorail is used.

Foundry Practice—Bulletin of the Carnegie Institute of Technology, Schenley Park, Pittsburgh, Pa., announcing courses in foundry practice.

Group Insurance—A booklet issued by The Travelers Insurance Company, Hartford, Conn., containing many interesting facts about employment problems.

Polishing and Plating—A folder issued by Crown Rheostat & Supply Company, 1910 West Park avenue, Chicago, Ill., describing the Thompson acid pump.

Patterns—A folder issued by the American Pattern and Manufacturing Company, York, Pa., covering its work in designing and constructing patterns for all types of castings.

"Liquid Sulphur"—A folder issued by Sulphur Products Company, Greensburg, Pa., on Liquid Sulphur—a highly concentrated compound for producing all oxidized finishes.

Cold Rolling and Finishing Machinery—A folder issued by the Blake & Johnson Company, Waterbury, Conn., describing and illustrating its No. 1104 Straightener-and-Shear machine.

Cost of Overhead—Business Leaflets—Number 9, issued by Policyholders' Service Bureau, Business Management Service, Group Division, Metropolitan Life Insurance Company, New York.

Carbon Blacking—A folder has been issued by Frederic B. Stevens, Detroit, Mich., on carbon blacking used as a core-wash; a wet blacking, and a dust-bag facing on green sand molds.

Iron Filler or Cement—A folder entitled "Stevens Stopper" has just been issued by Frederick B. Stevens, Inc., Detroit, Mich., on its iron filler or cement for "stopping" up holes in defective castings.

Metal Cleaner—A booklet entitled "How Science Speeds Up Metal Cleaning," issued by The Cowles Detergent Company, Lockport, N. Y., setting forth some fundamental principles about the science of cleaning.

Zinc Paint—A new paint put out by the New Jersey Zinc Company, 160 Front street, New York City, composed of "XX" Zinc Oxide 40 per cent; "Albalith" (Lithopone) 40 per cent; Silica 10 per cent; Asbestine 10 per cent.

Resistance and Other Wires—A catalog issued by the Gilby Wire Company, Newark, N. J., covering the principal materials produced by that company, such as copper, aluminum, nickel and alloy wires. They also produce wire gauges.

Norton Floors—Norton Company, Worcester, Mass., has issued the following folders: Floor and Stair Tile; Aggregate Tile Thresholds, Treads and Platforms, Ceramic Mosaic Tile and Treads; Aggregates. The folders are well illustrated.

Refractory Mortar—The Keystone Refractories Company, 120 Liberty street, New York, has published a new copyrighted booklet on the application of Dura-Stix for bonding and extending the life of fire-brick in boiler and metallurgical furnaces.

Electric Fans—A review of the use of electric fans for blowing, exhausting, ventilating, cooling and drying is contained in a booklet issued by the Buffalo Forge Company, Buffalo, N. Y. It is amply illustrated with views of installations in various types of industrial plants.

Grinding, Polishing and Plating Materials. Walter C. Gold, of Philadelphia, Pa., has just issued a series of 22 sectional catalogues covering his entire line—grinding, polishing and plating materials. These catalogues measure 3½ x 6"—are handsomely printed and profusely illustrated.

White Enamel—Hilo Varnish Corporation, Brooklyn, N. Y., has issued a folder, entitled "Wake Up the Daylight in Walls and Ceilings," describing Hi Lite gloss white enamel and Hi Lite flat white enamel, two new Hilo products, particularly for use in large industrial plants, public buildings, etc.

Oil or Gas Fired Furnaces—A folder issued by Alfred Fisher Furnace Company, 803 W. Madison street, Chicago, Ill., covering core oven, fired; crucible furnace, fuel oil burners for boilers; crucible pit furnace; aluminum kettle furnaces; also Karmix, for repairing or rammed in linings. The folder is well illustrated.

Unit Heaters—Some interesting data for the factory management and small shop owner regarding the use and advantage of unit heaters are contained in a bulletin describing Breezo-Fin Heaters, manufactured by the Buffalo Forge Company, Buffalo, N. Y. The text is well illustrated, including tables of capacities and dimensions. Form 1912.

Automatic Station Control Equipment—A 27-page bulletin on Automatic Station Control Equipment has recently been issued by he General Electric Company and is designated as No. 47731. It describes briefly the uses and advantages of this type of equipment, and is well illustrated. The greater part of the bulletin is given over to a list of installations up to January 1, 1924, giving the name of the company, station, type of apparatus, kilowatt capacity and incoming and outgoing voltage.

Electric Furnaces—The Detroit Electric Furnace Company has just had issued a catalog, describing in detail, the advantages, performances and results obtained with their electric brass furnaces in the brass melting field. The outstanding features of economy, mechanical control and speed of production are all clearly enumerated and described. This booklet is known as the "Speedier Production—Better Brass" catalog and contains very important and specific information with many illustrations.

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

BRASS MANUFACTURERS

Headquarters, City Hall Square Building, Chicago, Ill.

The National Association of Brass Manufacturers held a successful meeting at the Old Colony Club in the Hotel Cleveland, Cleveland, Ohio, on September 16th-17th and 18th—it was successful from the point of attendance as well as achievement.

Among the many topics discussed was that of the discoloration of nickel-plating, where some tests and investigation developed lack of care rather than inferior workmanship, and it was pointed out that constant cleaning with soap and water would keep all plating goods that are rightly plated in proper condition, regardless of atmospheric conditions. Another thing, particularly in plating work, around kitchens and pantries is gases arising from foods and cooking, this can be overcome in the above method, but no gritty substance or anything of an emery nature should at any time be used in cleaning plating. Frequently, cleansers containing the above substances are used which harms the plating—kerosene, ammonia or gasoline can be used with good results. Anyone having suggestions to offer along this line will be thankfully received by Commissioner Webster.

Various standards pertaining to openings of lavatories, both tubs and other fixtures, and brass goods pertaining to water work matters were adopted, and metal mixture was standardized both as to ingredients and physical properties for brass goods used in connection with underground service.

Copper	85%
Tin	5%

Lead	4%
Zinc	7%

The physical test should not be less than 15,000 lbs. per sq. inch, and the tensile strength not less than 30,000 lbs. The hydraulic test 200 lbs. water and 80 lbs. air pressure.

All curb stops with check to close clockwise.

The foregoing will no doubt prove of interest to superintendents of water works in various cities and localities.

It developed that all members present, and this no doubt applies equally to the few who were not present, are now stamping their name plainly on all their goods, and a resolution to this effect was unanimously adopted, so that in case of any trouble coming up or goods proving defective, the houseowner, contractor, plumber or jobber can quickly tell from whence it came.

An Associated Membership was adopted, permitting those engaged in making parts of good collateral to finished products in the water brass goods line eligible to membership, and a number of applications under this new form were received, the membership fee of which is $150 per annum, without returns or rebates.

Just before adjournment a poll of the meeting showed a decided improvement in business conditions for the past ten days or two weeks.

After a three days' successful meeting adjournment was had to meet next on December 9th, 10th, 11th, in New York City.

AMERICAN ELECTROCHEMICAL SOCIETY

Headquarters, Columbia University, New York

An unusual amount of interest has been aroused in the forthcoming meeting of the American Electrochemical Society, to be held at the Hotel Tuller, Detroit, Michigan, October 2, 3, and 4. The subjects covered by the program have a wide commercial bearing.

Two sessions will be devoted to the subject of "Corrosion," a subject of interest not only to the electrochemist, but to engineers in every field of activity. Contributions to this live subject have been received from all parts of the world and the sessions promise to be very well attended.

Detroit is the heart of the automobile industry of this country and it is very fitting for the society to have at this time an open forum on the topic "Industrial Electric Heating," in which field the automobile industry has made such remarkable strides. Prof. C. F. Hirschfeld, of the Detroit Edison Company, is responsible for an admirable program on this topic of Electric Heating.

There will also be sessions on Refractories for Electric Furnaces and the Physical Chemistry of Electrodeposition.

A round table discussion has been arranged on "Control Methods in Electrodeposition," in charge of Prof. O. P. Watts, of the University of Wisconsin, and Dr. Wm. Blum, of the Bureau of Standards.

Aside from the technical and scientific program, the entertainment committee has spared no effort in making the visit of the society members a memorable one. For Wednesday evening, October 1, a "Get-Together" Fish, Frog and Chicken Dinner at the famous Eastwood Inn has been arranged. Other entertainment feature include a smoker at Hotel Tuller Roof Garden, automobile trips and theatre party for the ladies, and visits to a number of the large automobile plants.

TECHNICAL PROGRAM

Thursday, October 2, 1924

9:30 A. M. Symposium on "Corrosion," Dr. B. D. Saklatwalla, Chairman.

22. F. N. Speller: Film Protection as a Factor in Corrosion.
18. Cecil H. Desch: The Micro-Chemistry of Corrosion.
6. Ulick R. Evans: The Relation between Tarnishing and Corrosion.
14. J. Newton Friend, D. W. Hammond and G. W. Trobridge: The Influence of Emulsoids upon the rate of Solution of Iron.
5. W. H. Hatfield: The "Stainless" Chromium Steels.
17. F. N. Speller and F. G. Harmon: Comments on Electrolytic Theory of Corrosion by Wilder D. Bancroft.

2:00 P. M. Symposium on "Corrosion" continued.

26. C. M. Kurtz and R. J. Zaumeyer: The Corrosion of Iron Alloys by Copper Sulphate Solution.
27. Geo. P. Ryan: The Effect of Cold Working on the Corrosion of Metals.
28. E. W. Greene and O. P. Watts: Effect of Reduced Pressure on the Rate of Corrosion of Amalgamated Zinc in Acid and in Alkali Solutions.
29. Wm. E. Erickson and L. A. Kirst: Tests for Grading Corrosion Resisting Alloys.
8. Colin G. Fink and Li Chi Pan: Insoluble Anodes for Brine. The Lead-Silver Series. (Preliminary Note.)
20. H. S. Rawdon and A. I. Krynitsky: Notes on Corrosion Testing by Different Immersion Methods.

Friday, October 3, 1924

9.00 A. M. Symposium on "Industrial Electric Heating," Professor C. F. Hirshfeld, Chairman.

9. Robert M. Keeney: Annealing of Brass Tubing in the Electric Furnace.

Electrical Furnace Refractories, Dr. M. L. Hartmann, Chairman.

21. M. L. Hartmann and O. B. Westment: Thermal Conductivity of Carborundum Refractories.

12:30 P. M. Round Table Discussion at Luncheon, Hotel Tuller. "Control Methods in Electrodeposition," in charge of Messrs, O. P. Watts and Wm. Blum.

2:30 P. M.

7. Fr. Foerster: Electrolytic Chlorate as a Secondary Product. (The Electrolysis of Hypochlorite Solutions.)
1. Thomas P. Campbell: The Electrolysis of Ammoniacal Zinc Carbonate Solutions.
3. M. deK. Thompson: The Production of Chromates from Ferro-Chromium Anodes.
12. Per K. Frölich: The Introduction of Carbonaceous Matter in Electrodeposited Iron and Nickel.
15. H. E. Haring: Throwing Power, Cathode Potentials and Efficiencies in Nickel Deposition.
11. Per K. Frölich: The Amphoteric Character of Gelatine and its Bearing on Certain Electrochemical Phenomena.

Saturday, October 4, 1924

9:00 A. M.

2. R. F. Mehl: Experiments on the Preparation of Very Pure Alloys and a Preliminary Study of Certain Electrical Properties of the System Al-Mg.
4. Louis Kahlenberg and H. H. Kahlenberg: On the Preparation of Metallic Tungsten and some of Its Alloys.

AMERICAN ELECTROPLATERS' SOCIETY

PHILADELPHIA BRANCH

Headquarters, care of George Gebling, 500 Edmund Street

The regular monthly meeting of the Philadelphia Branch was held on Friday night, September 5, at the Harrison Laboratory, U. of P., and was well attended. On account of the volume of business on hand the report of the delegates to the convention was laid over to some future meeting. Four new members were elected to active membership, and four new applications were received, also one member was reinstated. The committee for the coming banquet, to be held on the Saturday before Thanksgiving, November 22, was appointed with Willard M. Scott as chairman.

As he promised, our electro-chemical instructor was on hand and started right in to make the members sit up and take notice. He started with the calibration of the volumetric apparatus; he had them checking up on the discrepancies in reading the meniscus on their flasks and burettes, after which he took up the definition of standard solutions, the general methods of preparation, the general points in procedure and manipulation. The next hour was taken up with the neutralization reactions, the precipitation reactions, also the definitions of the different indicators.

All of which was so interesting that the members didn't want to break up and go home, which speaks well for both the instructor and the members present.

The Philadelphia Branch has adopted the policy of having an instructor at all its meetings, having realized that the lack of interest and poor attendance in previous years was due to the failure of the branch to compete with live, active movements of the day. The Philadelphia Branch is now giving all the opportunity to do and accomplish just what a good live active Foreman Plater should do. There is no standing still and remaining satisfied with past achievements.

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Personals

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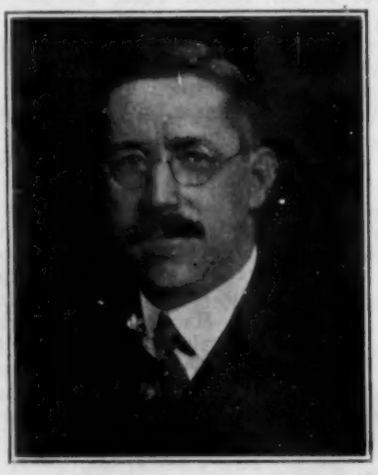
Nathaniel K. B. Patch was born in Franklin Township, Keweenaw Point, Michigan, the center of the Lake Superior copper deposits. His early education was gained largely in the public schools of Buffalo, and he later entered the Massachusetts Institute of Technology where he studied mechanical engineering. Owing to the strain on his eyes, he was forced to abandon this course before its completion.



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Born in the copper country of Michigan, he became deeply interested in copper and its uses and applications at an early age. He also acquired much information relative to copper and its refining from his father, Maurice B. Patch, who was one of America's experts on copper refining and metallurgy. It was, therefore, natural that he should enter the field of non-ferrous metals. Shortly after leaving the Institute of Technology, he associated himself with the Lumen Bearing Company in the capacity of a salesman, but very promptly realized that both his tastes and capacity lay in the manufacturing end. The company sent him to Canada in 1904 to open up and operate their Canadian branch. This branch was operated for about ten years, but it was found that the Canadian market was insufficient to make it desirable to continue, and it was, therefore, closed in 1914. Mr. Patch returned to the Buffalo office of the Lumen Bearing Company to take a position as secretary and plant engineer. He was later advanced to general superintendent, and from that to works manager in 1919.

In the study of the many problems connected with the development and manufacture of the company's products he has been deeply engaged for many years, principally with reference to metallurgy and foundry practice. In this work he has perfected a number of processes for the company, and some of his inventions have proved valuable in improving their products.

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Henry R. Towne, of Stamford, founder of the Yale & Towne Company, celebrated his 80th birthday, August 30. He was born in Philadelphia and entered the government service in the Civil War as an iron worker. He was appointed superintendent of the Richmond Iron Works by the government. In 1868 with Linus Yale, he founded Yale & Towne. In 50 years, the products brought a sale increase of almost $75,000,000, starting with $1,600,000 during the first 10 years.

Three scientists and engineers of the General Electric Company presented papers at the sixth annual convention of the American Society for Steel Treating, held in Boston from September 22 to 26, inclusive. **Dr. Wheeler P. Davey,** of the Research Laboratory, will speak on "The Application of X-Ray Crystal Analysis to Metallography." **S. L. Hoyt,** also of the Research Laboratory, will speak twice on "Metallurgical Education" and "The Ball Indentation Hardness Test." **E. F. Collins,** consulting engineer in the industrial heating department, will speak on "The Relative 'Over-all' Economic Worth of Electric Heat versus Fuel for Heat Treating Processes Has a Floating Value." At the session at which Mr. Collins will speak there will also be talks on the use of oil and gas for heat.

Deaths

EDWIN C. HENN

Edwin C. Henn, director of the National Acme Company, Cleveland, Ohio, was killed at a grade crossing near Painesville, Ohio, August 20, when his machine was struck by a train. He was accompanied by Oscar A. Smith, who was also killed.

Mr. Henn was born in New Britain, Conn., June 5, 1863. As a boy he worked in the brass finishing trades in New England, and went to school at the same time. He learned the brass foundry business with Landers, Frary & Clark, and after leaving school he became a brass finisher with Russell & Irwin.

At the age of 18 he took a position with the Joel Hayden Brass Company at Lorain, Ohio, leaving them to go with Powell Company of Cincinnati. In 1883 he went into business as a contractor, making brass valves for the Pratt & Cady Company. Later he organized the Standard Manufacturing Company of Hartford.

Mr. Henn became interested in automatic screw machines and followed this new development, at that time, to the extent of taking employment with Pratt & Whitney as a demonstrator and experimenting on machines. He later organized the Acme Machine Screw Company, and then the National Manufacturing Company to manufacture screws on these automatic machines. Later these two companies were combined into the National Acme Manufacturing Company, and moved to Cleveland in 1902.

Mr. Henn was general superintendent and vice-president of this company from 1901 until 1924, when he was succeeded by his son, Oliver L. Henn. He remained a director of the company. He was a member of the American Society of Mechanical Engineers, and a number of clubs in Cleveland. He leaves a widow, six sons and two daughters.

FRED EUGENE NEWELL

Fred Eugene Newell, for many years head of the Newell Brass Foundry, died at his home in Pawtucket, R. I., on September 11, 1924, after having been confined to his bed only four days, although he had been in failing health for several months. He was born in Smithfield, R. I., December 21, 1852, and was a graduate from the East Greenwich Academy and later from the Bryant & Stratton Commercial College. Leaving his studies he went to work for his father in his brass foundry in High street, Pawtucket. Founded in 1845 in a small shed in the town of Cumberland, the business was steadily growing, and Mr. Newell worked with his father until 1879, when, catching the gold fever, he went to California and worked in the gold fields about a year. Returning, he became a partner in his father's business under the firm name of William Newell & Company.

On the retirement of the father in 1886 the son became the sole owner of the business, changed the name to the Newell Brass Company and developed one of the largest concerns in his line in New England. He was active in many public and fraternal connections. He was a member of the Masonic bodies, the American Mechanics, the Ancient Essenic Order, Knights of Pythias, Order of Red Men, Order of Elks, had been a member of the Pawtucket Fire Department and at different times of the Light Guards and Union Guards of Pawtucket and the United Train of Artillery of Providence. He was also active in politics, being a delegate to one National Republican Convention, member of the Rhode Island General Assembly for two years and member of the Central Falls School Committee. He is survived by his widow, three daughters and a son.

CHARLES H. HARRUB

Charles H. Harrub, 89 years of age, chief engineer of the Waterbury Brass Company and the American Brass Company for over 40 years, died at his home, 81 Elmwood avenue, Waterbury, Conn., August 21. The funeral services were held August 23 at his home and the burial was in Pine Grove Cemetery.

Mr. Harrub was born in Scituate, Mass., and was working in New Bedford as an engineer when the Civil War broke out. He enlisted in the Navy as engineer of the gunboat Genessee, serving with Farragut in Mobile Bay and on the Mississippi. After the war he was chief engineer on several Long Island Sound boats, finally entering the employ of the Waterbury Brass Company as chief engineer, 46 years ago.

OSCAR A. SMITH

Oscar A. Smith, superintendent of the Screw Division of the National Acme Manufacturing Company, was killed while driving with Edwin C. Henn, a director of that company, at a grade crossing near Painesville, Ohio, when their machine was struck by a train. Mr. Smith was born in New Britain, Conn., 55 years ago. He associated himself with Mr. Henn about 1894, and was active all his life in developing Acme machines. He was a well known member of the Society of Automotive Engineers.

EDWARD T. CARTER

Edward T. Carter died of acute indigestion on August 30 at Belmont, Vt., while on vacation there. Mr. Carter was born in New Haven, Conn., 69 years ago. He took over the brass and bronze casting business in 1902, established by his father, and had maintained it since.

EDWIN S. MOLDENHAUER

On August 4 Edwin S. Moldenhauer, vice-president and general manager Milwaukee Die Casting Company, Milwaukee, Wis., died after a brief illness with heart trouble. He was 50 years of age and a native of Wisconsin.

J. W. GRAHAM

As we go to press, the death is announced of J. W. Graham, of the Kitson Company, Philadelphia, Pa.

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

NEW ENGLAND STATES

WATERBURY, CONN.

OCTOBER 1, 1924.

Business in the local brass industries has passed the low point and while it is none too brisk as yet, it is slowly on the upgrade, according to the heads of the industries.

The **Chase Companies** state that practically every department in the manufacturing plant has been running 55 hours per week all summer long. The rolling mill had been running only 40 hours until the middle of August, but since that time has been operating 55 hours. The number of applicants for employment at both plants has been about the same, but the low point in the number of hours and the number of employes has been passed, they state.

John Goss, superintendent of the **Scovill Manufacturing Company**, states that he is none too optimistic, although he believes that the low point in the curve has been reached and the upward swing has started, but that it is not so rapid as he would like. It is perhaps just as well that it does not pick up too rapidly, he says, as a slowly improving business makes for better stabilization than too rapidly improving business.

As he promised, our electro-chemical instructor was on hand and started right in to make the members sit up and take notice. He started with the calibration of the volumetric apparatus; he had them checking up on the discrepancies in reading the meniscus on their flasks and burettes, after which he took up the definition of standard solutions, the general methods of preparation, the general points in procedure and manipulation. The next hour was taken up with the neutralization reactions, the precipitation reactions, also the definitions of the different indicators.

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George W. Cooper, who for the past sixteen years has been advertising manager of THE METAL INDUSTRY, has become president of the Glass Industry Publishing Company, which issues a monthly publication known as *The Glass Industry*, with offices at 50 Church street, New York. THE METAL INDUSTRY wishes him every success in his new enterprise.

Henry R. Towne, of Stamford, founder of the Yale & Towne Company, celebrated his 80th birthday, August 30. He was born in Philadelphia and entered the government service in the Civil War as an iron worker. He was appointed superintendent of the Richmond Iron Works by the government. In 1868 with Linus Yale, he founded Yale & Towne. In 50 years, the products brought a sale increase of almost $75,000,000, starting with $1,600,000 during the first 10 years.

Three scientists and engineers of the General Electric Company presented papers at the sixth annual convention of the American Society for Steel Treating, held in Boston from September 22 to 26, inclusive. **Dr. Wheeler P. Davey,** of the Research Laboratory, will speak on "The Application of X-Ray Crystal Analysis to Metallography." **S. L. Hoyt,** also of the Research Laboratory, will speak twice on "Metallurgical Education" and "The Ball Indentation Hardness Test." **E. F. Collins,** consulting engineer in the industrial heating department, will speak on "The Relative 'Over-all' Economic Worth of Electric Heat versus Fuel for Heat Treating Processes Has a Floating Value." At the session at which Mr. Collins will speak there will also be talks on the use of oil and gas for heat.

Deaths

EDWIN C. HENN

Edwin C. Henn, director of the National Acme Company, Cleveland, Ohio, was killed at a grade crossing near Painesville, Ohio, August 20, when his machine was struck by a train. He was accompanied by Oscar A. Smith, who was also killed.

Mr. Henn was born in New Britain, Conn., June 5, 1863. As a boy he worked in the brass finishing trades in New England, and went to school at the same time. He learned the brass foundry business with Landers, Frary & Clark, and after leaving school he became a brass finisher with Russell & Irwin.

At the age of 18 he took a position with the Joel Hayden Brass Company at Lorain, Ohio, leaving them to go with Powell Company of Cincinnati. In 1883 he went into business as a contractor, making brass valves for the Pratt & Cady Company. Later he organized the Standard Manufacturing Company of Hartford.

Mr. Henn became interested in automatic screw machines and followed this new development, at that time, to the extent of taking employment with Pratt & Whitney as a demonstrator and experimenting on machines. He later organized the Acme Machine Screw Company, and then the National Manufacturing Company to manufacture screws on these automatic machines. Later these two companies were combined into the National Acme Manufacturing Company, and moved to Cleveland in 1902.

Mr. Henn was general superintendent and vice-president of this company from 1901 until 1924, when he was succeeded by his son, Oliver L. Henn. He remained a director of the company. He was a member of the American Society of Mechanical Engineers, and a number of clubs in Cleveland. He leaves a widow, six sons and two daughters.

FRED EUGENE NEWELL

Fred Eugene Newell, for many years head of the Newell Brass Foundry, died at his home in Pawtucket, R. I., on September 11, 1924, after having been confined to his bed only four days, although he had been in failing health for several months. He was born in Smithfield, R. I., December 21, 1852, and was a graduate from the East Greenwich Academy and later from the Bryant & Stratton Commercial College. Leaving his studies he went to work for his father in his brass foundry in High street, Pawtucket. Founded in 1845 in a small shed in the town of Cumberland, the business was steadily growing, and Mr. Newell worked with his father until 1879, when, catching the gold fever, he went to California and worked in the gold fields about a year. Returning, he became a partner in his father's business under the firm name of William Newell & Company.

On the retirement of the father in 1886 the son became the sole owner of the business, changed the name to the Newell Brass Company and developed one of the largest concerns in his line in New England. He was active in many public and fraternal connections. He was a member of the Masonic bodies, the American Mechanics, the Ancient Essenic Order, Knights of Pythias, Order of Red Men, Order of Elks, had been a member of the Pawtucket Fire Department and at different times of the Light Guards and Union Guards of Pawtucket and the United Train of Artillery of Providence. He was also active in politics, being a delegate to one National Republican Convention, member of the Rhode Island General Assembly for two years and member of the Central Falls School Committee. He is survived by his widow, three daughters and a son.

CHARLES H. HARRUB

Charles H. Harrub, 89 years of age, chief engineer of the Waterbury Brass Company and the American Brass Company for over 40 years, died at his home, 81 Elmwood avenue, Waterbury, Conn., August 21. The funeral services were held August 23 at his home and the burial was in Pine Grove Cemetery.

Mr. Harrub was born in Scituate, Mass., and was working in New Bedford as an engineer when the Civil War broke out. He enlisted in the Navy as engineer of the gunboat Genessee, serving with Farragut in Mobile Bay and on the Mississippi. After the war he was chief engineer on several Long Island Sound boats, finally entering the employ of the Waterbury Brass Company as chief engineer, 46 years ago.

OSCAR A. SMITH

Oscar A. Smith, superintendent of the Screw Division of the National Acme Manufacturing Company, was killed while driving with Edwin C. Henn, a director of that company, at a grade crossing near Painesville, Ohio, when their machine was struck by a train. Mr. Smith was born in New Britain, Conn., 55 years ago. He associated himself with Mr. Henn about 1894, and was active all his life in developing Acme machines. He was a well known member of the Society of Automotive Engineers.

EDWARD T. CARTER

Edward T. Carter died of acute indigestion on August 30 at Belmont, Vt., while on vacation there. Mr. Carter was born in New Haven, Conn., 69 years ago. He took over the brass and bronze casting business in 1902, established by his father, and had maintained it since.

EDWIN S. MOLDENHAUER

On August 4 Edwin S. Moldenhauer, vice-president and general manager Milwaukee Die Casting Company, Milwaukee, Wis., died after a brief illness with heart trouble. He was 50 years of age and a native of Wisconsin.

J. W. GRAHAM

As we go to press, the death is announced of J. W. Graham, of the Kitson Company, Philadelphia, Pa.

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

NEW ENGLAND STATES

WATERBURY, CONN.

OCTOBER 1, 1924.

Business in the local brass industries has passed the low point and while it is none too brisk as yet, it is slowly on the upgrade, according to the heads of the industries.

The **Chase Companies** state that practically every department in the manufacturing plant has been running 55 hours a week all summer long. The rolling mill had been running at 40 hours until the middle of August, but since that time has been operating 55 hours. The number of applicants for employment at both plants has been about the same, but the low point in the number of hours and the number of employes has been passed, they state.

John Goss, superintendent of the **Scovill Manufacturing Company,** states that he is none too optimistic, although he believes that the low point in the curve has been reached and the upward swing has started, but that it is not so rapid as he would like. It is perhaps just as well that it does not pick up too rapidly, he says, as a slowly improving business makes for better stabilization than too rapidly improving business.

At the office of the **American Brass Company,** it was stated that business is slightly better and that a few more employees are working than during the past two or three months. They did not care to predict what the general business conditions would be during the coming months.

President **W. E. Fielding,** of the **Mattatuck Manufacturing Company,** states that at present the entire plant is running 55 hours a week, although until a short time ago it was running on short time. Things are looking better, he states. More orders are coming in and not so many people are looking for employment at the plant as a short time ago.

The **Waterbury Clock Company** states there has been a slight increase in the working hours per week, but no perceptible increase in the number of men employed. It states that business is a trifle better than it has been, but that it always is every fall, and the improvement is no guaranty of good business conditions during the coming months.

Although business appears to be slightly better at the **Oakville Company,** it was stated by Superintendent **W. H. Boden,** that it is not operating any more hours per week or employing any more hands than during the past several weeks. Election year never makes much difference to this company in the amount of business transacted, he said.

The **Waterbury Farrel Foundry and Machine Company** states that fewer employees are on the payroll at present than during the past few months.

Miss Costenbader, of the Industrial Employment Bureau here, states that while she has received more applicants for jobs the past week than during other weeks in the summer, there have been fewer local people applying for work, most of those applying coming from out of town. She states she thinks conditions locally are improving.

George E. Willey, superintendent of the local State Employment Bureau, states that he is having very few applications for help from the factories, although from general observation he expects more help will be needed during the next few weeks. There is a big demand for domestic help, he says.

The **Department of Labor's** monthly summary of labor conditions states of Waterbury: "Most plants are operating, but on a five-day a week basis, and there is a surplus of skilled mechanics who are unable to find employment. Building programs provide work for large numbers of tradesmen.

The **Seth Thomas Clock Company,** of Thomaston, has just completed and shipped the largest clock in the world, destined for the plant of **Colgate & Company,** in Jersey City. It is 50 feet across the dial, its minute hand is 37 feet long and the hour hand is 27½ feet long. The weight of the minute hand and counterbalance is 2,200 pounds. The weight of the hour hand is 1,725 pounds and the entire weight of movement and hands is four tons. The dial will be plainly visible for miles out in New York harbor. The tip of the minute hand travels 157 feet in an hour's time. A flat car was required to ship the hands from the factory to the site of the dial as they would not fit in a box car. The only clock in all history which even approached this in size is the ancient one in Mechlin, Belgium, destroyed by the Germans, which had a dial diameter of 40 feet.

The pin department of the **American Pin Company** is being transferred to the **Oakville Company** plant. The pin making business and all the machinery and equipment used in making pins is already being moved from one plant to the other, if not already completed. Both plants were recently acquired by the **Scovill Manufacturing Company,** and it is understood that the change is the result of the new owners' plan for consolidating all competing departments of the three plants. Hereafter, the Oakville company will manufacture all the pins made heretofore by the three plants and the American Pin Company will manufacture novelties, it is said.

Former stockholders of the **American Brass Company,** now stockholders in the **Anaconda Copper Company,** are jubilant over the report just issued by the parent company stating that the American Brass company is "now running at a good rate with three months' orders ahead" and attributing much credit for the present flourishing condition of Anaconda to the output of the local plant. The report shows that although copper is one cent below the 1923 average, Anaconda is earning between $3 and $3.25 a share after all bond interest, depreciation and taxes are paid. Announcement has also been made that Anaconda has opened up one of the richest copper deposits in the history of the Butte district, assaying 40 per cent copper and 12 ounces of silver to the ton.

James R. Walker, city plumbing inspector, attended the national convention of plumbing engineers at Philadelphia, last week and carried with him two pieces of pipe, one an ordinary iron pipe and the other brass. Both had been used for a similar length of time in one of the city's big buildings, but while the iron pipe was badly corroded and worthless, the brass pipe showed no effect of the years of service. He used the pipes as a point to his address urging the superiority of brass to iron pipe for all plumbing purposes.

The **Bristol Company Foremen's Association** held an outing and clambake at Osborn's Glen, Naugatuck, Sept. 6th. **J. A. H. Peterson** was the general chairman. After the clambake the afternoon was spent in playing ball, quoits, tug of war. **W. H. Bristol,** president of the company, was present and furnished music with his audiophones.

The pinmakers of the American Pin company held their annual outing Aug. 29th at Botelle's farm, Bantam. They made the trip in automobiles. A dinner was held, following which sports were enjoyed and prizes awarded. The Brass pinmakers won the baseball game with the Iron pinmakers. **C. A. Dubois** presented the prizes and also a gift from the employes to **John Kay** who retires after 26 years of service.

Over 1,700 employes and friends of the Scovill Manufacturing company took a two day outing in New York and Coney Island, Sept. 6th.

Practically all the local manufacturers gave the local Defense Day program, Sept. 12th, their unstinted support and followed the request of the War Department for reports on the facility of industrial mobilization of their plants in case of war.—W. R. B.

BRIDGEPORT, CONN.

October 1, 1924.

The **Bridgeport Brass Company** is engaged in a controversy with the city over the reduction of the company's taxes by a former administration. The company's taxes for 1920 were abated $120,000 by issuance of a writ of error. Edward A. Drew recently started action through the city attorney to compel payment by the Brass company of this $120,000 and threatened to seize and sell a sufficient quantity of the company's assets to satisfy the tax claim. The company replied by securing an injunction from Judge John R. Booth restraining him from carrying out his threat. It has also instituted a suit for damages of $10,000 against Mr. Drew, personally, alleging that its reputation has been injured by his action.

The case is now before Judge L. P. Waldo Marvin of the Superior court. Mr. Drew has demanded that the company make its complaint more specific, arguing that it has failed to set forth the basis on which the former tax collector granted the $120,000 reduction in taxes. Judge Marvin has reserved his decision.

The **Department of Labor's** report on business conditions in Bridgeport states, "All plants are running, some on part time. Farm work is absorbing a large number of those released from the factories. Building and construction work slowed down during the past month with craftsmen working only part time."

The **Raybestos Company** has purchased from the **American Tube & Stamping Company** for approximately $15,000, a 100 foot strip of land on Bostwick avenue. The first named firm plans to expand its plant and the second named to center its activities in the East Side mills. The Raybestos Company intends to construct a new unit on the land bought, shortly.

Two-thirds of the old **Lake Torpedo Boat Company** plant at the foot of Seaview avenue has been bought by the **Forsberg Manufacturing Company** of 200 Cannon street from **Samuel Grossman** who bought the property at the recent auction. The purchase includes the main machine shop, 80 by 300 feet with its stationary machinery, shafts, benches, etc., and two smaller shops. The Forsberg company will move in immediately and will increase its manufacture of builders' hardware and hack saw frames.

The remaining third at the southern end of the plant has been sold to the **Bridgeport Dredge and Dock Company.** This includes a number of buildings, docks, permanent machinery and the testing basin.

Scientific research may be necessary to root out facts desired by the Bridgeport Brass Company to be used in advertising literature. The firm has asked the Bridgeport library technology department to solve the mystery of the origin of the expression "getting down to brass tacks." The phrase has recently been revitalized by its use by a vice-presidential candidate. The library states the request is the oddest and may prove one of the most difficult it has ever been called upon to solve.—W. R. B.

TORRINGTON, CONN.

OCTOBER 1, 1924.

All Torrington plants are operating on a schedule of at least 50 hours a week and some are on a 55-hour schedule.

"Inside of 30 days every factory in Torrington will be operating on full time—55 hours," said a representative of the manufacturers in talking with a METAL INDUSTRY correspondent several days ago.

Not only have the time schedules been extended but many of the plants are taking on additional workers.

Continued improvement in general conditions may be anticipated through the fall and early winter, in the opinion of those in close touch with affairs in the metal industry.

Bertrand G. Peck of the **Fitzgerald Manufacturing Company** of Torrington is named as one of the incorporators of the **A. T. Smith Electric Company**, which has been incorporated in Winsted, this state, with a capital stock of $50,000 to manufacture electrical equipment and supplies. The other incorporators are H. H. Howd and Alva T. Smith, both of Winsted.

The **Torrington Company** of Maine has increased the number of its directors from seven to nine. The nine directors of the Torrington Company of Connecticut are also the directors of the Maine corporation.

John F. Alvord, late president of the Torrington Company and affiliated with many other manufacturing concerns in the east, left an estate of $4,074,620, according to an appraisal filed in New York.

Torrington factories returned to standard time schedules on Monday, September 29.—J. H. T.

PROVIDENCE, R. I.

OCTOBER 1, 1924.

The past month has shown a slight improvement in business—very slight, perhaps, but still perceptible to those who are holding their finger on the pulse of conditions. This improvement is seen not only in the general optimistic tone, but in the actual volume. This is especially the case in the various building trades, as well as in the several branches of the manufacturing jewelry industry.

But while there are indications of some improvement it is not so strong or so pronounced as could be desired. The optimism seems to be with the managements rather than with the workers, the latter having more of the pessimistic view of the situation. This is undoubtedly dut to the fact that nearly all of the large establishments hereabouts that have resumed operations, whether textile, rubber or metal trades, have done so with a drastic cut of from 10 to 25 per cent in wages.

The **Brown & Sharpe Manufacturing Company,** however, after a shutdown of four weeks, reopened the first of the month, the operators resuming their places on the same basis as when the plant was closed down. A regular time working schedule is in effect and there have been no changes in the wage scale, the management states. Although no figures have been announced, it is understood that approximately the same number of employees are still on the payrolls as none were laid off when the plant suspended operations.

A statue of Epinard, the famous French horse that won the Grand Prix and is now racing in this country, was cast in bronze at the foundry of the **Gorham Manufacturing Company,** at its plant in Elwood early in the month. It is the work of Kathleen Wheeler, English sculptress, who has specialized in the modeling of famous race horses.

The valuation of the rotable property in the city of Providence—real, tangible and intangible—according to the 1924 tax assessment certified by the Board of Tax Assessors to the City Treasurer early in September for collection, is $559,597,070 as compared with $531,758,840 last year, a gain of $27,838,340. This assessment will provide a revenue amounting to $14,341,380.03, an increase of $504,810.81 over the revenue of a year ago, and the largest that was ever received by the city from this source. There are 58,859 tax accounts this year, as compared with 54,047 accounts, included in the 1923 assessments. Of the 58,859 accounts, 1,463 are against corporations, firms and individuals assessed upon a valuation of $50,000 each or more.—W. H. M.

MIDDLE ATLANTIC STATES

ROCHESTER, N. Y.

OCTOBER 1, 1924.

There is very little to report relative to the industrial situation among the metal using manufacturing plants of Rochester. Business during the past month has not been enthusiastic in character, but manufacturers the city over are of an optimistic trend of mind and they are almost unanimous in the belief that before snow flies a genuine forward movement will begin. Several plants in Rochester have been quite fortunate in many respects, particularly those concerns producing parts that are included in telephone and radio equipments.

The **Stromberg-Carlson Company** is devoting much activity to the production of certain radio equipment, and consequently is in a position to utilize considerable copper, aluminum and antimony. The **Eastman Kodak Company** is also using more brass and aluminum in its film-making industry.

No new enterprises are contemplated, metal men report, and none are expected until the new year has arrived. Metal men throughout the city look forward with confidence to a marked expansion in manufacturing and general business shortly after election.—G. B. S.

NEWARK, N. J.

OCTOBER 1, 1924.

Judge Charles C. Hommann, of Perth Amboy, N. J., has been appointed by Vice-Chancellor Bentley as temporary receiver for the **Chemical Pump and Valve Company,** of Newark, N. Y. This proceeding comes as the sequel to prolonged litigation between four brothers, who are interested in the company. Vice-Chancellor Backes, some months ago, decided that each had transgressed against the other. An accounting is still in progress before a special master. It is said that as a consequence of this dissension business has decreased, being only $6,312.35 in 1922 as against $51,082.15 in 1917. It is said that the liabilities are only $5,000 as against assets which include a $40,000 plant and machinery and $6,300 in cash.

The following concerns were incorporated during the past month. **Barber Sheet Metal Works,** Newark, N. J., $50,000 capital, to manufacture metal goods. **R. E. Thompson Radio Corporation,** Jersey City, N. J., 140,000 shares, to manufacture radio supplies; **Avon Sheet Metal Works,** Newark, N. J., $125,000 capital, to manufacture sheet metal; **Industrial Conveyer Company,** Newark, N. J., $100,000 capital, to manufacture metal belting; **United Radio Corporation,** Newark, N. J., $250,000 capital, to manufacture radio supplies; **Rexsine Company, Inc.,** Newark, N. J., $125,000 capital, to manufacture aluminum signs.—C. A. L.

TRENTON, N. J.

OCTOBER 1, 1924.

While conditions are picking up at the Trenton metal industry plants, yet some of the factories are not running to

capacity. The big plant of the **Jordan L. Mott Company,** which went into the hands of receivers some time ago, is not operating on full time. The receivers hope to have all the departments running before winter. The **Skillman Hardware Manufacturing Company** and the **Trenton Brass and Machine Company** continue to operate to capacity, while other plants manufacturing metal goods report conditions as being good. No attempt has yet been made to operate the plant of the **Orr Machine Guarding Company,** which went into the hands of a receiver some time ago. **Joseph T. Lanigan,** receiver, expects to wind up the affairs of the company soon.

The property of **Katzenbach & Bullock,** former chemical dealers of this city, was sold at public sale recently. The company one time conducted one of the largest business of its kind in this section, but met with reverses.

Vice Chancellor Backes has signed an order directing **Charles E. Stokes,** receiver for **Duncan Mackenzie Sons Company,** founders, to settle demands of the creditors who have filed claims, and whose claims have been allowed by the receiver. Demands of more than $21,000 have been filed and allowed by Mr. Stokes under a previous order of the court.

The **Delgro Electrical Manufacturing Company,** with offices in New Brunswick, has established a new plant at Highland Park. New machinery has been installed and the concern will specialize in the manufacture of radio parts, including insulated lead insulators, copper lugs, etc. New lines will be added later. **George N. DeLaplaine** and **Rudolph S. Groch** are the officials of the new company.

Max Movshovitz, former president of the **Trenton Zinc and Chemical Company,** Trenton, N. J., filed a petition in the United States Court at Trenton, seeking to be declared bankrupt. According to his petition he has liabilities of $93.143 and assets of $82. The bulk of his liabilities are the result of the failure in former business enterprises. His assets are in the form of stocks which he holds. The largest single liability is 37,500 in the form of a secured note held by the Mercer Trust Company, Trenton, N. J. A $6,000 note given to Carl Adams as compensation for reorganizing the Trenton Zinc and Chemical Company is also listed. This note was secured by stock in that company, which stock, the petition says, is now worthless. Mr. Movshovitz founded the Trenton Zinc and Chemical Company some years ago and for a long time the concern prospered.

Oliver O. Bowman, treasurer of the J. L. Mott Company, recently celebrated his 86th birthday at his home at Trenton. He gave a small family dinner at his home. He is also vice-president of the Broad Street National Bank, Trenton, N. J.—C. A. L.

PHILADELPHIA, PA.

October 1, 1924.

If there were but two jobbers in the Philadelphia district selling non-ferrous metals, both could reasonably assert present business conditions to be excellent, but as there are quite a number seeking the few orders offered, all say business is poor, with the exception of lead, which during the last week or ten days has been fairly strong with a better demand. But, in general, the metal trade in Philadelphia is featureless, almost stagnant. Despite the low prices of some of the metals, orders are very small and the trade is discouraged at the small purchases of the consumers. All sorts of arguments have been advanced by the brokers to stimulate trade without any appreciable effect. Consumers simply remain out of the market. The prices of most of the metals are low, yet this important factor is non-business producing.

There is, however, expected to be a revival of better business conditions, most of the jobbers say, and many orders are expected to be placed for brass and copper and lead for use in new buildings now under construction. There is a wider use of brass pipe here than heretofore with an equal increase in the amount of sheet copper being used for roofing. The local automobile accessory manufacturers have made some sizable purchases as have lead pipe and lead covered wire manufacturers. Zinc has been fairly steady with a lessening demand expected. Bronze sales are small compared with six months ago. Prices are holding fairly steady despite the depression.

Reports received by jobbers indicate that tin plate mills are working about 60 to 70 per cent capacity. Sales of block tin are slightly better than last month and prices are a little higher.

Nickel platers report that the plumbing fixture manufacturers are placing more orders and that the business revival looked for so long is now beginning to manifest itself. Most of this demand is made on the plumbing manufacturers by builders in the local territory. Several hotels are being completed and a considerable portion of the nickel-plated pipe and fixtures will be used. Plating of other merchandise is fair.

Sales of scrap metals are increasing with an attendant rise in price.—A. F. C.

PITTSBURGH, PA.

October 1, 1924.

The **Westinghouse Electric and Manufacturing Company** awarded the contract for the erection of a one and four-story addition to its plant at Mansfield, O., to the Scholl Wolfe Company of Mansfield. Work will be started at once.

Considerable has been printed concerning the order for 40,000 tons of galvanized sheets for the Argentine to be used in exterminating locusts, awarded to the American Sheet and Tin Plate Company in Pittsburgh, so that our sole contribution will be to state that the sheets will be manufactured into a special size to meet the needs of the country. Each sheet will be 18 inches wide and 59 inches long. It is planned to attach these sheets to uprights in the fields of the Argentine, to form a metal fence 18 inches high. The sheets will be punched so that they may be clamped together. If one fence were made it would run for 14,000 miles, or more than half way around the globe.

It was only after negotiations of several months that this order came to the United States. The contract was signed only after the Argentine government made a number of modifications in their specifications.—H. W. R.

MIDDLE WESTERN STATES

INDIANAPOLIS, IND.

October 1, 1924.

The **Golden Foundry Company, Columbus,** Ind., with a capital of $35,000, has been incorporated and will operate a foundry. The incorporators are Walter I. Golden, Sudie E. Smith and Charles Shipman.

The **Muncie (Ind.) Products Company,** a subsidiary of General Motors, will add 100 men to its working force immediately, bringing the total up to 1,200. When running at full capacity, the plant employs about 3,000 men. It has been adding gradually to its working force for several weeks. Many other manufacturing companies, whose plants have been operated on short time for several weeks, are planning to increase the number of their employees this month.

Funeral services for **Herman Lifchitz,** 1664 College avenue, president of the H. Lifchitz Foundries and Machine Works, 554 East Washington street, and a resident of Indianapolis for more than thirty years, who died suddenly Aug. 29, were held Aug. 31 at the home. Mr. Lifchitz, pioneer business man of East Washington street, was one of the founders of the local B'Nai Brith and was president of it years ago. He was also prominently identified with charities and a life-long member of the Congregation of Keneseth Israel. Death was due to brain hemorrhages.—E. B.

DETROIT, MICH.

October 1, 1924.

The **National Plating & Enameling Company** has recently been incorporated at Jackson, Mich., with a capital stock of $25,000 for the purpose of engaging in nickel plating, silver plating, enameling and a general manufacturing business. The stockholders are Joseph A. Watson, Loretta A. Watson and James H. Van Pelt, Owasso, Mich.

According to official announcement, the merger of the **C. F. Bohn Foundry Company,** one of the largest makers of automobile aluminum castings, and the **General Aluminum & Brass Manufacturing Company,** of Detroit, has been perfected. The consolidation move has been in consideration for several

months. According to bankers and others engaged in the metal industry, the new arrangement will be productive of much good. C. F. Bohn formerly was resident manager of the local branch of the Aluminum Company of America.. Later he organized the foundry company which has been a big factor in the manufacture of aluminum blocks for automobile motors, brass fixings and other hardware. It is stated at the present time the plant is booked to capacity for the remainder of the year.

It is announced that the **Burton Bronze Company,** recently organized at Grand Rapids, Mich., as the manufacturers of metals and castings, has established its place of business at 1452 Buchanan avenue, S. W., Grand Rapids. The company's president is B. T. Moore; vice-president, W. H. Lindae; secretary, George Peters; treasurer. John F. Vos. The capital stock is $25,000.

The **Pemberthy Injector Company, Detroit,** has recently declared its quarterly dividend of two per cent on the preferred stock.

The **Sparks-Withington Company,** Jackson, Mich., manufacturers of automobile accessories, reports earnings for the last six months of $183,061. These earnings were equivalent to $38.89 per share of preferred stock, and after deduction of the preferred dividend the balance was equivalent to $5.24 per share on the common stock.

Edmunds & Jones Company has recently declared an extra dividend of 50 cents on its common stock in addition to the quarterly disbursement of 50 cents and the regular one and three-fourths per cent preferred dividend, all payable October 1, to stock of record of September 20.

The brass, copper, aluminum and gray iron business has developed no unusual conditions during the past month. Plants are not operating to full capacity and there is no apparent indication of a change for the better—not for some time at least. The automobile industry continues slow and not until this shows an improvement is there any prospect for a betterment of the industries that depend on it for business.

The **Bachrach & Company,** Detroit, is the name of a new concern recently incorporated under Michigan laws, to deal and traffic in metals, scrap and kindred articles. The capital stock is $25,000. The stockholders are Emil Ortner, 1373 S. First street, Louisville, and Max Bachrach and Frank Bachrach, both of Detroit.—F. J. H.

CHICAGO, ILL.

October 1, 1924.

Dealers in metals in the Chicago districts are practically agreed that the long period of dullness which has marked their trade for the past few months has just about ended and things are beginning to stir in their markets. Although some of the manufacturers still report quiet business and slow markets, with some prospects of improvement, however, dim as they may be, still others of the metal men are gratified with the volume of business they have been doing for the past month, and are highly elated over the outlook for the immediate future. With factories going again at almost full capacity with the automobile trades energetically at work again, and with the railroads an unusually active participant in the markets, the metal men have been able for the most part to observe a notable advance in conditions, and the establishment of the trade for the present on a much firmer basis than it has had for some time.

The uncertainly of business conditions and the previous utter depression in the metal business, accounted for chiefly by adverse weather, the European situation, and the fact that this is a presidental year, are passing and with their departure there seems to loom a sunrise of activity for the lead, brass, copper, tin and aluminum dealers.

People have been slower getting back into the markets than was expected, and this also, has prevented the wheel of business from picking up the velocity which would ordinarily have been the case. In the next thirty days, however, the situation should be considerably more encouraging than it is at present.

The **Hoyt Metal Company** has found it necessary to increase its factory at Granite City, Ill. An addition more than 300 feet long has been built, estimated to cost more than a half a million dollars, according to **George J. Sharkey,** of the Chicago office.

Louis Birkenstein, president of the **Globe Metal Company,** Chicago, is in Berlin with his wife at the present time. Mr. Birkenstein is spending several months visiting Europe, combining both business and pleasure on the trip.

Incorporations that have been recently announced in Illinois include:

J. and I. Manufacturing Company, 2215 W. Jackson boulevard, Chicago. Capital $100,000. Manufacture and deal in metal specialties. Incorporators: Evelyn M. Coyle, Samuel G. Stephenson and R. G. Chapman. Correspondent: Hyde, Hennings, Thulin, Westbrook, and Watson, 19 S. La Salle street.

Illinois Flourspar and Lead Company, Cave-in-Rock, Illinois. Capital $25,000. Develop, mine, mill and deal in flourspar, lead, barytes and ores, minerals and clays. Incorporators: C. R. Hamilton, A. L. Douglas and J. E. Hanon. Correspondent: J. E. Hanon, Cave-in-Rock, Ill.

OTHER COUNTRIES

BERMINGHAM, ENGLAND

September 16, 1924.

Business in some of the branches of the brass trade has improved. The industry throughout the period of depression has suffered far less from employment than have some of the other trades of the country. At present there is a shortage of casters the loss of craftsmen during the war not having been filled up owing to the reluctance of the younger generation to submit itself to training for such forms of employment. Apart from the steady demand, especially from the British Colonies, for steam gas and water fittings and stamped brassfoundry, the brass trade owes much of its fortunate position to its adaptation to new requirements such as those of the automobile trade. The metal trades are now benefiting by the slow but progressive revival in shipbuilding, orders being on the increase for doorplates for the saloons of liners and for brass, bronze and copper fitments of various descriptions. With the termination of the builders' strike, door and window fittings and other builders' brassfoundry are in a little better request. Extensive railway rolling stock orders are expected to bring a good deal of work to the Midland metal trades. Hearth furniture manufacturers have prepared for a good winter trade. For the most part their business is done at home, the open grate being still a great British institution, but there is a considerable call from Britons overseas for toasting forks, old-fashioned brass candlesticks and other metal articles in which use and decoration are combined. Bedstead manufacturers are now making much greater use of brass in the cheaper patterns. There is a growing preference (as also in coal vases and other hearth furniture) for oxydized surfaces, with a preference for silver finishes. Business in bedstead trade both at home and for export is again dull. Electro-platers have become much busier, but, to meet the demand for lower prices, the tendency is towards less substantial plating. A good deal of the work on hand is still for small cheap articles used as advertising presents. In general metal goods business during the last few weeks has slackened to the disadvantage of the rolling mills though the lamp trade is showing a little more enterprise than in former winters. Demands for sheet metal, castings, pressings, stampings and extruded metals from the automobile trades have fallen off, but the decline is seasonal and is not so great as was prophesied when the repeal of the McKenna import duties was announced. Tube mills are poorly employed. A good demand exists for telegraph wire, but in qualities used for springs, business is very quiet. In new and scrap metals buying is only in small lots, but sellers do not show readiness to make concessions for the sake of bigger business.—G.

Business Items—Verified

California Wire Company, Orange, Calif., is building a plant at Pittsburgh, Calif., to manufacture insulated wire for electrical purposes.

Columbian Hardware Company, 1296 E. 53rd street, Cleveland, Ohio, is erecting a building 90 x 201 ft., estimated cost $50,000. The building has been leased to Fuerst, Friedman Company, of Cleveland.

The **Hilton Brass Foundry Company,** 371 Boyden avenue, Hilton, N. J., is in the market for 1 medium sized hand miller, 1 Barker wrenchless chuck, 1 drill press with reversible attachment, back geared, if possible.

Anton Esz has purchased the foundry and goodwill of the Eagle Casting Company, 90 University place, New York. This concern specializes in gold, silver, aluminum and bronze castings for the silversmiths and jewelry trades.

The **Sterling Electro Plating & Polishing Company,** has opened a plating shop at 210-212 Canal street, New York City, for job plating in gold, silver, nickel, copper and brass. This firm operates the following departments: lacquering, plating, polishing.

Work is in progress on a new one-story plant 85 x 420 ft. for the **Michigan Copper & Brass Company,** 5851 Jefferson avenue, Detroit, Mich., estimated to cost $100.000. This firm operates the following departments: tool room, casting shop, rolling mill.

Fairgrieve & Son, 50 Dovercourt road, Toronto, Ont., Canada, are in the market for an oven for baking japan. This firm operates the following departments: tool room, japanning, stamping, soldering. They have also installed the Parker rust proof process.

The **Bennett Manufacturing Company,** Alden, N. Y., has awarded contract for the construction of factory 120 x 160 ft. with a 40 x 80 ft. wing, to replace the building destroyed by fire. This firm operates the following departments: tool room, plating, stamping, polishing, lacquering.

The **Arkansas Foundry Company,** Little Rock, Ark., is rebuilding a portion of its plant at the foot of E. 6th street, recently destroyed by fire. This firm operates the following departments: Bronze and aluminum foundries, brass machine shop, tool room, grinding room, casting shop.

A statement was recently published in another magazine regarding the construction of a new addition to the plant at Camden, N. J., of the **Armstrong Cork Company.** This addition has long since been completed and the company has been occupying and using these building for the past five months.

The **Dynamic Plating Company,** formerly of 49 Maiden lane, is now located at larger quarters at 153 West 21st street, New York City, where it makes a specialty of plating metal novelties in gold, silver, nickel, brass and copper. This firm operates the following departments: plating, lacquering, polishing.

The **United Smelting & Aluminum Company,** Hampden, Conn., is planning to rebuild its plant destroyed, some time ago, by fire. The project calls for an expenditure of $100,000. This firm operates the following departments: smelting and refining; brass, bronze and aluminum foundries; aluminum rolling mill.

Due to the death of **Henry J Richards** in October, 1923, the active management of the **New Haven Copper Company,** Seymour, Conn., was taken over by John H. Ballantine. With this change in management came also a change in stockholders, and on the board of directors at the present time are also J. E. Searle and F. S. Gourley.

Howard A. Kenworthy, supervisor of construction for Charles F. Kenworthy, Inc., Waterbury, Conn., is in England and on the continent inspecting the plants of Kynoch, Ltd., W. T. Henley's Telegraph Works, Ltd., and The London Electric Wire Company, and Smiths, Ltd., where large units of their Non-Oxidizing Annealing Furnaces are being installed.

Aluminum Company of America, Pittsburgh, Pa., has given notice of reduction of part of its bonds, pursuant to the provisions of the Indenture of Trust dated October 1, 1921, made by the company to Bankers Trust Company, Trustee, securing $18,000,000 of its twelve-year seven (7) per cent sinking fund debenture gold bonds. Those bonds drawn by lot by the Trustee were redeemed on October 1, 1924.

The **Buckeye Products Company,** 919 West 5th street, Cincinnati, Ohio, manufacturer of foundry facings and kindred equipment, is erecting a factory building which will be used to manufacture core oils, foundry parting, core compound, non-ferrous metal melting furnaces and various foundry specialties. In addition to the regular manufacturing departments there will also be a machine shop and laboratory.

The **Agate Foundries, Inc.,** 17215 Park avenue, Chicago, Ill., has been incorporated to manufacture and deal in brass and aluminum. The company was formed with $25,000 capital. J. B. Brownlee, Paul Wachel and D. H. Brownlee are incorporators, and J. G. MacDonald, 1200 Westminster building, is correspondent. This firm will operate the following departments: brass, bronze and aluminum foundries, grinding room, casting shop, cutting-up shop.

The **Penn Hardware Company,** foot of Spruce street, Reading, Pa., manufacturer of builders' hardware, etc., has awarded a general contract to C. H. Schlegel, Mount Penn, Pa., for the erection of a two-story addition, estimated to cost $60,000, including improvements in the present factory. This firm operates the following departments: brass, bronze foundries, tool room, grinding room, casting shop, spinning, plating, japanning, polishing, lacquering.

E. Ingraham Company, clock manufacturers, Bristol, Conn., is planning erection of three additions to its plant to cost $100,000. An addition will be built to the main factory building in the form of a two-story automobile room, mill construction 186 x 75 ft., also an 80 x 80 ft. addition to the warehouse. Additional mechanical equipment will be required. This firm operates the following departments: tool room, plating, stamping, soldering, polishing, lacquering.

Buck, Kiaer & Company, Inc., 9 E. 46th street, New York City, importers of raw materials for the steel industry, have have recently been appointed United States Sales Agents for fluor spar for **Geo. G. Blackwell Sons & Company, Ltd.,** Liverpool, England, who produces spar of various grades which has been supplied to the steel, chemical, brass enamel and glass manufacturers. Mr. Buck was previously the United States sales representative of the British America Nickel Corporation, Ltd., and Mr. Kiaer who has many close European connections, is a man of wide shipping experience.

Through the activity of the **Jay P. McDermott Agency,** one of the realtors of Milwaukee, Wis., the old established and well known concern, **Henry A. Poppert & Sons Company,** of Milwaukee, will enter Mon du Lac's industrial life. The business of the concern embraces a brass and aluminum foundry, pattern works and machine shop, required in the production of White House steam cookers, which will constitute the output of the local plant. The company has acquired a piece of property on Park avenue, north of Scott street, being the former Bull Dog Tractor plant, a comparatively new building.

A $6,000,000 merger of the **Charles B. Bohn Foundry Company** and the **General Aluminum & Brass Manufacturing Company,** both of Detroit, Mich., was brought about through the efforts of **A. B. Turner,** of Boston, Mass. While the directors have agreed to the merger, it is subject to ratification by the stockholders. **Charles B. Bohn** will be president of the merger company, and **Leo M. Butzel** will be added to the present board of idrectors. General Aluminum stockholders will receive one new share of no par stock and $4 cash for each present share $10 par value they now hold. The firm will be known as the **Charles B. Bohn Aluminum & Brass Manufacturing Company.**

INCORPORATIONS

The **Independent Foundry Supply Company,** First and Spruce streets, St. Louis, Mo., has been incorporated with capital of $10,000 to manufacture foundry supplies and platers' equipment. It has factory and equipment sufficient for present needs. M. A. Bell is president.

Flynn-Wolff Bronze Coundry, Swissvale, Pa., has been incorporated for $15,000.00, by J. E. Flynn, Pittsburgh; M. J. Flynn, Swissvale and Ervin A. Wolff, Pittsburgh. The company has erected a new all-steel fire-proof building at Ardmore street and P. R. R., Swissvale. This company will operate the following departments: brass, bronze and aluminum foundries; grinding room.

Burton Bronze Company, Grand Rapids, Mich., has been formed with $25,000 capital, to manufacture non-ferrous metals and castings, by B. T. Moore, room 514, 110 South Dearborn street, Chicago, Ill., W. H. Lindae and George Peters. The plant is nearly complete, and will start operating shortly. Three more units will be added in the Spring of 1925. This firm will operate the following departments: smelting and refining, aluminum foundry, tool room, brass machine shop, grinding room, galvanizing, brazing, plating, japanning, tinning, soldering, polishing, lacquering.

Torrington Specialty Company, Torrington, Conn., recently incorporated with authorized capital of $50,000, will manufacture household utensils, motor accessories and metal novelties. The company owns property in Torrington on which it will build a factory some time in the future, its work at present being done on contract, the assembling being taken care of in rented space in Torrington. E. W. Morgan, for many years identified with brass foundry products, is president of the company and in charge of operations. P. H. Allison is vice-president and J. A. Green, secretary and treasurer. This firm will operate the following departments: brass foundry, brass machine shop, tool room, cutting-up shop, plating, japanning, polishing, lacquering.

BUSINESS TROUBLES

By a recent vote of its stackholders the **Conley Tinfoil Comany,** of New York, will be dissolved.

There was a vacancy in the office of trustee and a special meeting of the creditors was held in Springfield, Mass., in the matter of **Brightwood Bronze Foundry Company,** bankrupt, Springfield, September 12, 1924, for the creditors to attend, prove their claims, appoint a trustee and transact other business.

It was ordered that the creditors and stockholders of the **McNab & Harlin Manufacturing Company,** bankrupt, of Paterson, N. J., and all persons interested in the property of this company show cause before the U. S. District Court on September 15th, 1924, in the Chamber of Commerce building, 20 Branford place, Newark, N. J., why the receivers should not sell at public sale some property of McNab & Harlin Manufacturing Company, consisting of a house, stable and lot.

METAL RESEARCH IN ENGLAND

Meetings of the Empire Mining & Metallurgical Congress are being held at the British Empire Exhibition, Wembley. One of them was addressed by Dr. R. S. Hutton, Director of the British Non-Ferrous Metals Research Association. He stated that the income of the Association and its membership were already two and one-half times what they were two years ago, and an expenditure for the current year of £13,500 was contemplated. Tangible results of the research work were coming forward in increasing number. Over twenty separate investigations were in hand. Full advantage was being taken of the excellent metallurgical laboratories in national and academic institutions and where the nature of the investigations demanded, arrangements had been made to carry out work in industrial establishments. Consequently there had been no need so far for the Association to equip laboratories of its own. The three years' work devoted to copper research had shown that we were in sight of the time when explanations would be forthcoming of what were hitherto difficulties in the refining and working of copper. The Association's brass casting research represented the determination of a whole section of the industry to obtain still higher quality of sheet metal. The doors of nine works were open to detailed observational study. Subsequently a visit was paid to a French factory where entirely different methods were in vogue. Those were conditions for investigation such as no individual effort could have afforded. Important investigations were in hand on aluminum, nickel, lead, tin, etc., and on such general subjects as the jointing and polishing of metals. Suggestions for twenty-four new researches had been received, but so far it had been possible only to commence six in addition to those already in hand.

JEWELRY STANDARDS

At the annual meeting of the Birmingham Jewelers' and Silversmiths' Association, it was reported that good progress had been made with the movement for establishing standard trade descriptions for goods made of precious metals, which are not hall-marked, and for stones used in conjunction with them. The schedule of descriptions adopted last year, at a public meeting of manufacturing goldsmiths, has been approved and adopted by all the leading trade associations. A bill drafted for the Rolled Gold, Gilt and Imitation Jewelry Section and introduced by the Rt. Hon. Austen Chamberlain, M. P., was read for the first time in the House of Commons, on Feb. 14th, and it is hoped will soon become law. In the Real Jewelry Section of the Trade, measures for giving statutory meaning to terms and descriptions relating to gold and platinum goods, which are not hall-marked, and the stones used in conjunction with them, have received the unanimous approval of the trade. Pending legislation, some 650 firms have signed an undertaking to support all these recommendations and to buy only goods which conform to them.

The association has made a protest to the Governor of the Royal Mint, on behalf of Birmingham medalists and badge-makers, against a proposal on behalf of the mint, to undertake medal work in competition with private firms. The matter is still under consideration.—G.

GERMANY BUYS SILVER

Germany has bought 4,000,000 ounces of silver at current market price from American Smelting & Refining Company, United States Smelting, Refining & Mining Company, Anaconda Copper Mining Company and American Metal Company, in that order of participation.

This is the second large sale of silver to Europe by American producers for coinage. A few weeks ago Poland bought in two lots here 6,400,000 ounces of silver.

Several months ago Austria was in the American market, but British silver dealers at that time were willing to sell cheaper than American producers. It is believed that these sales are forerunners of a considerable demand from the eastern Europe countries for silver to be used in rehabilitating their currencies.—New York Wall Street Journal.

ANTIMONY IN 1923

The antimony market in the United States made a notable improvement in 1923, according to the Department of the Interior, as shown by statistics compiled by the Geological Survey. The average price of antimony in 1923 was 7.81 cents a pound, as compared with 5.42 cents in 1922. Nevertheless very little antimony ore was produced from domestic deposits in 1923, and most owners of the deposits report that they can not profitably mine antimony ore unless the price of the metal is about 20 cents a pound. The smelter production of by-product antimonial lead was 14,190 tons, containing 2,170 tons of antimony. The recovery of secondary antimony from old alloys, scrap, and dross, mostly at secondary smelters, was 8,021 tons, valued at $1,252,800.

ABRASIVE MATERIALS IN 1923

The production of natural abrasive materials in 1923 was much larger than in 1922, according to a statement issued by the Department of the Interior, prepared in the Geological Survey. The total quantity produced was about 250,000 tons, valued at more than $4,000,000. In addition there was produced in 1923 more than 80,000 tons of artificial abrasives, valued at $8,778,000.

QUICKSILVER IN 1923

The condition of the quicksilver industry in 1923 was somewhat better than in 1922, according to a statement issued by the Department of the Interior, prepared by Clyde P. Ross, of the Geological Survey. There was on increase of nearly 14 per cent in the average price at San Francisco and an increase of nearly 25 per cent in the production. The price of the metal declined from $70.70 in the first week of 1923 to $59.35 in the last week, and the average for the year was $65.68. California produced 69 per cent of the 7,937 flasks of quicksilver credited to the United States in 1923, and most of the remainder was produced in Texas.

GRAPHITE IN 1923

The graphite mining industry in the United States made considerable progress in 1923 according to a report prepared in the Department of the Interior by the United States Geological Survey, in co-operating with the geological surveys of Alabama, Michigan and New York. During the World War this country flourished, for graphite is an essential war mineral, and stocks of it, both domestic and foreign, were accumulated. Consequently in the years immediately after the war the industry languished. In 1923, however, there was an increase in the quantity sold and imported, as well as in value, the sales amounting to 4,056 tons of amorphous graphite and 3,964,900 pounds of crystalline graphite, compared with 2,200 tons of amorphous graphite and 1,849,766 pounds of crystalline graphite in 1922. The manufacture of artificial graphite at Niagara Falls, N. Y., reached the high mark of 26,761,015 pounds, more than twice the output there in 1922. The quantity of graphite imported for consumption rose from 12,488 short tons in 1922 to 19,434 tons in 1923, an increase of 56 per cent.

MANUFACTURE OF FIREARMS

The Department of Commerce announces that, according to reports for the Biennial Census of Manufactures, 1923, the establishments engaged primarily in the manufacture of firearms in that year produced pistols and revolvers valued at $3,624,860, rifles valued at $3,708,874, and shotguns valued at $7,915,008, together with other products valued at $2,278,379, making a total of $17,527,121. The rate of increase in the total value of products as compared with 1921, the last preceding census year, was 36 per cent.

Firearms to the value of $1,775,774 were manufactured in 1921 as secondary products by establishments engaged primarily in other industries, whereas in 1923 no firearms were manufactured outside the industry proper. The addition of this sum to the value of products reported for the industry for 1921 gives a total of $14,659,616, in comparison with which the industry total for 1923 shows an increase of 19.6 per cent.

Of the 20 establishments reporting for 1923, 9 were located in Connecticut, 5 in Massachusetts, and the remaining 6 in Michigan, New York and Pennsylvania.

LEAD PIPE, AND BAR AND SHEET LEAD

The Department of Commerce announces that, according to data collected at the biennial census of manufacturers, 1923, the establishments engaged primarily in the manufacture of lead products reported a total output valued at $19,294,655, of which amount $8,407,390 was contributed by lead pipe, $3,244,024 by sheet lead, $4,964,467 by other lead products (traps, bends, bars, shot, fittings, wire, calking lead, and lead rings and castings), and $2,678,774 by all other products, such as babbitt, solder, and mixed metals. The rate of increase in the total value of products as compared with 1921, the last preceding census year, was 84.2 per cent.

In addition, lead bar, pipe, and sheet were manufactured to some extent by establishments engaged primarily in other industries. The value of such commodities thus produced outside the industry proper in 1921 was $871,562, an amount equal to 8.3 per cent of the total value of products reported for the industry as classified. The corresponding value for 1923 has not yet been ascertained, but will be shown in the final reports of the present census.

The 29 establishments reporting for 1923 were located in California, Colorado, Georgia, Illinois, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Washington, and Wisconsin.

PLATED WARE

The Department of Commerce announces that, according to data collected at the biennial census of manufactures, 1923, the establishments engaged primarily in the manufacture of plated ware reported products valued at $53,640,181, an increase of 58 per cent as compared with 1921, the last preceding census year. The principal products of establishments assigned to this industry classification are knives, forks, spoons and other flatware, such as plates, platters, trays and saucers; hollow ware, such as bowls, cups, tea and coffee pots, pitchers and tureens; and miscellaneous articles, such as novelties, toilet sets, salt and pepper tops, etc.

In addition, plated ware was manufactured to some extent as a secondary product by establishments engaged primarily in other industries. The value of such products thus made outside the industry proper in 1921 was $2,094,020, an amount equal to 6.2 per cent of the value of products reported for the plated-ware industry as classified. The corresponding value for 1923 has not yet been ascertained, but will be shown in the final reports of the present census.

Of the 81 establishments reporting for 1923, 30 were located in New York, 27 in Connecticut, 11 in Massachusetts, 3 in Pennsylvania, and the remaining 10 in Illinois, Indiana, Maine, New Hampshire, New Jersey, Ohio, Rhode Island and Virginia.

ALUMINUM MANUFACTURERS

The Department of Commerce announces that, according to data collected at the biennial census of manufactures, 1923, the establishments engaged primarily in the manufacture of aluminum castings, bars, plates, sheets, ware, etc., reported products valued at $106,930,367, an increase of 133.4 per cent as compared with 1921, the last preceding census year.

Of the 119 establishments reporting for 1923, 27 were located in Ohio, 14 in Wisconsin, 12 in Michigan, 11 in New York, 9 in Illinois, 7 in New Jersey, 6 each in Indiana, Massachusetts and Pennsylvania, 5 in California, and the remaining 16 in Colorado, Connecticut, Iowa, Minnesota, Missouri, Nebraska, Rhode Island, Tennessee and Washington.

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America	$100	$500	$525
American Hardware Corporation	100	78½	80
Anaconda Copper	50	37½	37¾
Bristol Brass	25	5	10
International Nickel, com	25	18¼	18½
International Nickel, pfd	100	87¼	88
International Silver, com	100	120	..
International Silver, pfd	100	105	110
National Enameling & Stamping	100	22¾	23
National Lead Company, com	100	156¾	157
National Lead Company, pfd	100	116½	118
New Jersey Zinc	100	157	159
Rome Brass & Copper	100	120	135
Scovill Manufacturing Company	..	243	248
Yale & Towne Mfg. Company, new	..	66⅝	67½

Corrected by J. K. Rice, Jr., Co., 36 Wall street, New York.

Review of the Wrought Metal Business

Written for The Metal Industry by J. J. WHITEHEAD, President Whitehead Metal Products Company of New York, Inc.

OCTOBER 1, 1924.

There were no outstanding features in the brass and copper industry during the month of August to be worthy of comment, other than the decline in the price of fabricated material such as rod, sheets, tubes and wire at the end of the month. This decline followed on the reduction in the price of ingot copper which has been weak through the entire month.

In keeping with general business conditions, together with the indicated weakness in copper, the brass and copper industry as a whole has continued to move along in desultory fashion with all of the trade apparently in the mental attitude of waiting for something to turn up. This has not done the jobbers very much harm as the consumers continuing their hand-to-mouth buying policy have been obliged to pick up their requirements from existing stocks, and the dealers therefore have enjoyed a fair amount of trade.

Many of the factors in the industry still cling tenaciously to the optimistic thought that business is going to be better one of these days, but the fact remains that bookings of new business still fall a long way short of the required amount necessary to put the mills on a full-time basis. Prices of fabricated materials, however, are being maintained to a degree which is much improved as compared with the conditions in the earlier part of the year, probably as the result of the conviction that has been borne in upon the minds of those connected with the industry, to the effect that very little if any new tonnage is uncovered by cut-throat price campaigns. As a result of this elimination of extreme price-cutting, the mills are somewhat more comfortable from the viewpoint of their balance sheet than they were some months ago, and with a fair volume of business being booked, they look to the future with some feeling of hopefulness in the belief that they will be able to take advantage of any resumption of general business activity which is sure to be felt very rapidly in the brass and copper industry.

A considerable improvement in the Monel metal and pure nickel branch of the industry is noted, and the bookings for September are greatly in excess of any of the preceding several months. This is accounted for by the resumption of buying on the part of some of the large consumers, and also by the number of new applications which have been found for these metals.

In that branch of the industry covering nickel alloys such as nickel silver and similar products, there is not to be noted any tremendous increase in activity, but a steady business is being done, and the principal factors in this line regard the situation as being as good as can be expected under the present business conditions.

Metal Market Review

Written for The Metal Industry by METAL MAN

OCTOBER 1, 1924.

COPPER

Easy market conditions have again developed in copper. After a brief period of firmer prices and moderately active demand in August, when the selling level rose to 13⅝ cents, a downward trend set in which depressed values to the 13 cents basis. Recent transactions were confined to moderate quantity and failed to have any stimulating market results. A general easing of the situation became apparent early in September, and despite frequent concessions business continued quiet.

Conditions lately have been unfavorable to market firmness owing to excessive supplies actually on hand and in prospect. More copper has been produced than could be sold, and the supply keeps steadily flowing in from domestic and foreign sources. South American properties have been steadily increasing shipments of copper into this country. It is also interesting to note that South Africa is prepared to become a big factor in the copper situation by producing upwards of 200,000,000 pounds annually. The ratio of supply to demand is therefore of commanding importance.

ZINC

Buyers have been taking zinc on moderate scale, but domestic demand is still too limited to impart strong vitality to the market. A fairly good foreign demand was a feature lately. Europe is unable to produce the necessary tonnage for its own requirements, hence the active demand from time to time for American zinc. Prices, however, are not as firm as they were a month ago. Prime Western brands are quoted at 6⅛ cents E. St. Louis and at 6.47½ cents New York. Domestic production in August amounted to 41,775 tons and deliveries were 43,558 tons. Stocks on hand at end of month were 50,922 tons, being a decrease of 1,783 tons as compared with stocks carried over at end of July. Present stocks in smelters hands are nearly double what they were a year ago.

TIN

Despite powerful foreign manipulation of tin which characterized market movements lately, fresh difficulties have beset bullish plans and prices suffered a drastic slump. At the beginning of September the New York market for Straits tin was quoted at 53⅜ cents, with London firm at £262 per ton. Heavy selling on the part of holders in London and the East, however, created pronounced unsettlement and weakness in the first half of September. Prices faded away rapidly and on September 22nd, London was down to £228 10s per ton for Straits tin and New York 45⅝ cents a pound. The situation became confused and unsatisfactory as current developments clearly indicated that the market was a plaything in the hands of London manipulations. The statistical position and trade conditions were apparently secondary factors while speculative operators indulged the whim suited to the plan and purpose in view. The world visible supply of tin September 1 was 21,302 tons, against 18,754 tons on September 1, 1923.

LEAD

There was on change in the base price of lead by the principal producer since August 15. The 8 cent New York level is the American Smelting & Refining Company's price, but the outside market is a shade below that figure at 7.85 cents E. St. Louis. Demand is not specially active as consumers have deliveries coming due to keep them going for several weeks. Producers are also well sold up for nearby shipment, and for that reason are not disposed to press sales. There are some outside holdings available at slight concessions. The tendency of the market is consequently quiet and steady. National Lead Company is reported ordinarily to require a stock of about 90,000 tons of lead. The annual requirements of this company are understood to amount to twice that tonnage.

ALUMINUM

Current demand for aluminum is sufficient to maintain the market on the same equally firm basis as a month ago. Output and offerings are being absorbed at a steady rate. Recent prices realized indicated that the market is in good position to round out a highly prosperous year. Distribution and consumption of both domestic and imported products has been broad enough to keep prices surprisingly stable. The future tendency of the market will depend to a considerable extent on conditions in the automobile industry. Trade interests are inclined to look for an expansion in the consumption of aluminum. Quotations for 99 per cent plus Virgin aluminum are 28 cents and for 98-99 per cent 27 cents.

ANTIMONY

Though trading in antimony is quiet the market is firm. Chinese sellers have been holding out for higher prices lately, and owing to a state of Civil War in China, the offerings from there are restricted. Some business was done at 9¼ cents in bond for spot and metal afloat. Spot stocks of Chinese regulars quote 11¼ cents duty paid, but buyers are not showing special interest under existing conditions governing shipment cargoes. Considerable holdings have been accumulated by Chinese speculators in expectation of higher prices. Supplies here are small and importations likely to be difficult. Under these circumstances scarcity of material and higher prices may develop.

QUICKSILVER

Holders are inclined to be firmer and on usual size orders $72.50 @ $73 per flask is quoted. Some recent business was reported at $71 per flask for a round lot, but sellers generally were asking higher figures. More inquiry is expected for last quarter delivery.

PLATINUM

Refined platinum quotes $118 an ounce. Demand is not large and buyers place orders with caution except where there is a suggestion of willingness to shade prices.

SILVER

The Silver bullion market showed definite improvement recently. The buying of various foreign countries caused an advance to 70 cents an ounce in the last half of September. China, India, Japan and Europe have made purchases. Russia has also been securing silver for mintage purposes, and large exports were made from England for Russian account. Germany is expected to continue a big customer for silver in this market. Demand is stimulating production. Mexico output is on the increase, and according to recent estimates that country is expected to produce somewhat near 90,000,000 ounces against 62,000,000 ounces of United States production. The American Smelting & Refining Company controls the bulk of Mexican output, together with United States Smelting, Refining & Mining Company and the American Metal Company.

OLD METALS

There has been an appreciable reaction in the scrap market owing to the decline in prices for some of the Virgin metals. All grades of copper and copper-bearing scraps have struck lower levels, with the possible exception of certain brass grades. With the new products reduced by manufacturers the market for old brass is bound to reflect conditions existing among the industry at large. Dealers are generally cautious about parting with stocks on hand at reduced prices. Buyers, however, are equally reserved and confine bids to a range considered reasonably safe. Prices dealers are prepared to buy at are 8¾c @ 9c for light copper, 10¼ c @ 10¼c for heavy copper, 6c @ 6½c for heavy brass, 8c @ 8¼c for new brass clippings, 6¾c @ 7c for heavy lead, 4½c @ 4¾c for new zinc scrap, and 20½c @ 21¼c for aluminum clippings.

WATERBURY AVERAGE

Lake Copper—Average for 1923, 14.979—January, 1924, 13.00—February, 13.125—March, 13.875—April, 13.625—May, 13.25—June, 12.75—July, 12.75—August, 13.625—September, 13.375.

Brass Mill Zinc—Average for 1923, 7.479—January, 1924, 7.25—February, 7.50—March, 7.25—April, 7.00—May, 6.00—June, 6.60—July, 6.70—August, 6.90—September, 7.00.

Daily Metal Prices for the Month of September, 1924

Records of Daily, Highest, Lowest and Average

	1*	2	3	4	5	8	9	10	11	12	15	16	17
Copper (f. o. b. Ref.) c/lb. Duty Free													
Lake (Delivered)	....	13.75	13.75	13.625	13.625	13.625	13.625	13.50	13.625	13.625	13.50	13.375	13.375
Electrolytic	....	13.50	13.50	13.375	13.35	13.25	13.20	13.15	13.30	13.25	13.15	13.125	13.125
Casting	....	13.125	13.125	13.125	13.125	13.00	13.00	13.00	13.00	13.00	13.00	12.875	12.875
Zinc (f. o. b. St L.) c/lb. Duty 1¼c/lb.													
Prime Western	....	6.30	6.275	6.25	6.225	6.175	6.15	6.175	6.20	6.25	6.25	6.25	6.20
Brass Special	....	6.35	6.325	6.30	6.30	6.25	6.25	6.275	6.30	6.30	6.30	6.30	6.30
Tin (f. o. b. N. Y.) c/lb. Duty Free													
Straits	....	53.375	52.25	52.375	52.00	50.875	51.125	50.75	50.90	50.125	49.00	37.00	47.50
Pig 99%	....	52.875	51.75	51.875	51.50	50.375	50.75	50.375	50.50	49.75	48.50	46.50	47.00
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	....	8.00	8.00	8.00	7.975	7.95	7.90	7.95	7.95	7.95	7.95	7.90	7.90
Aluminum c/lb. Duty 5c/lb.	....	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb													
Ingot—Internat. Nick. Co.	....	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50
Outside Spot	....	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50
Electrolytic (Internat. Nick. Co.)													
Ni.—99.80 contam. impur.—.14	....	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	....	10.25	10.50	10.75	11.00	11.00	10.75	10.75	10.75	11.00	11.00	11.125	11.125
Silver c/oz. Troy Duty Free	....	68.75	68.50	68.50	68.625	68.875	69.00	59.25	69.375	69.125	69.375	69.50	69.75
Platinum $/oz. Troy Duty Free	....	120	120	120	120	120	120	120	120	120	120	120	118

	18	19	22	23	24	25	26	29	30	High	Low	Aver.
Copper (f. o. b Ref.) c/lb. Duty Free												
Lake (Delivered)	13.375	13.375	13.25	13.25	13.20	13.20	13.125	13.125	13.125	13.125	13.125	13.430
Electrolytic	13.00	13.00	13.00	12.95	12.85	12.85	12.85	12.80	12.85	13.50	12.80	13.115
Casting	12.75	12.75	12.75	12.75	12.70	12.70	12.70	12.65	12.70	13.125	12.65	12.890
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	6.20	6.15	6.125	6.125	6.10	6.15	6.175	6.15	6.15	6.30	6.10	6.192
Brass Special	6.25	6.25	6.225	6.225	6.20	6.225	6.25	6.20	6.20	6.35	6.20	6.265
Tin (f. o. b. N. Y.) c/lb. Duty Free												
Straits	47.75	47.125	45.625	46.50	47.00	47.25	47.625	47.875	48.125	53.375	45.625	49.150
Pig 99%	47.25	46.625	45.125	46.00	46.50	46.75	46.625	47.375	47.625	28.875	45.125	48.649
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	7.875	7.875	7.85	7.85	7.825	7.80	7.80	7.85	7.80	8.00	7.80	7.902
Aluminum c/lb. Duty 5c/lb.	28.50	28.50	28.50	28.50	28.50	28.50	28.00	28.00	28.00	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb												
Ingot—Internat. Nick. Co.	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50
Outside Spot	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50
Electrolytic (Internat. Nick. Co.)												
Ni.—99.80 contam. impur.—.14	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	11.125	11.25	11.25	11.25	11.25	11.25	11.25	11.125	11.125	11.25	10.25	10.994
Silver c/oz. Troy Duty Free	69.375	69.125	69.75	69.875	69.875	69.75	69.875	70.00	70.125	70.125	68.50	69.351
Platinum $/oz. Troy Duty Free	118	118	116	118	118	118	118	118	118	120	118	119.048

*Holiday.

Metal Prices for October 1, 1924

Copper: Lake, 13.125. Electrolytic, 12.85. Casting, 12.625.
Zinc: Prime Western, 6.15. Brass Special, 6.20.
Tin: Straits, 48.375. Pig, 99%, 47.875.
Lead: 7.80. **Aluminum,** 28.00. **Antimony,** 11.00.
Nickel: Ingot, 29.00. Shot, 30.00. Electrolytic, Internat. Nick. Co., 33.00.
Quicksilver, flask, 75 lbs., $71.00. **Silver,** oz. Troy, 70.125.
Platinum, oz. Troy, $118. **Gold,** oz. Troy, $20.67.

Metal Prices, October 1, 1924

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	9⅝to10½
Brass Ingots, Red	11¼to12¼
Bronze Ingot	12 to13
Bismuth	$1.85
Cadmium	60
Casting Aluminum Alloys	21 to24
Cobalt—97% pure	$2.50to$2.75
Manganese Bronze Castings	22 to35
Manganese Bronze Ingots	11½to16
Manganese Bronze Forging	33 to42
Manganese Copper, 30%	28 to45
Parsons Manganese Bronze Ingots	18¼to19¾
Phosphor Bronze	24 to30
Phosphor Copper, guaranteed 15%	17½to20½
Phosphor Copper, guaranteed 10%	17 to20
Phosphor Tin, guaranteed 5%	60 to65
Phosphor Tin, no guarantee	53 to60
Silicon Copper, 10% ...according to quantity	28 to35

OLD METALS

Buying Prices		Selling prices
11 to11¼	Heavy Cut Copper	12½to12¾
10½to10¾	Copper Wire	11¼to11½
9 to 9¼	Light Copper	9¾to10
8¼to 8¾	Heavy Machine Comp	10 to10½
6½to 6¾	Heavy Brass	8¼to 8¾
5½to 5¾	Light Brass	6¾to 7
6¾to 7	No. 1 Yellow Brass Turnings	7¾to 8¼
7½to 8	No. 1 Comp. Turnings	9 to 9½
6¼to 6½	Heavy Lead	6¼
4	Zinc Scrap	4½
8	Scrap Aluminum Turnings	10
15½to16	Scrap Aluminum, cast alloyed	16½
18	Scrap Aluminum, sheet (new)	20
25	No. 1 Pewter	27
12	Old Nickel anodes	14
18	Old Nickel	20

BRASS MATERIAL—MILL SHIPMENTS

In effect Sept. 23, 1924

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.16⅞	$0.18⅝	$0.20⅝
Wire	.17⅜	.19⅛	.21⅛
Rod	.14⅝	.19⅜	.21⅜
Brazed tubing	.24⅞	.....	.30⅜
Open seam tubing	.24⅞	.....	.30⅜
Angles and channels	.27⅞	.....	.33⅜

To customers who buy less than 5,000 lbs. in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.17⅞	$0.19⅝	$0.21⅝
Wire	.18⅜	.20⅛	.22⅛
Rod	.15⅝	.20⅜	.22⅜
Brazed tubing	.25⅞	.....	.31⅜
Open seam tubing	.25⅞	.....	.31⅜
Angles and channels	.28⅞	.....	.34⅜

SEAMLESS TUBING

Brass, 21c. to 22c. net base.

Copper, 22¼c. to 23¼c. net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	18⅞c. net base
Muntz or Yellow Metal Sheathing (14" x 48")	16⅞c. net base
Muntz or Yellow Rectangular Sheets other Sheathing	17⅞c. net base
Muntz or Yellow Metal Rod	14⅞c. net base

Above are for 100 lbs. or more in one order.

COPPER SHEET

Mill shipments (hot rolled)	19⅛c. to 21⅝c. net base
From stock	20⅛c. to 22⅛c. net base

BARE COPPER WIRE—CARLOAD LOTS

15⅛c. to 15⅜c. net base.

SOLDERING COPPERS

300 lbs. and over in one order	19⅛c. net base
100 lbs. to 200 lbs. in one order	19⅝c. net base

ZINC SHEET

Duty, sheet, 15%. Cents per lb.

Carload lots, standard sizes and gauges, at mill, 9.85c. basis less 8 per cent discount.

Casks, jobbers' prices	11¼c. net base
Open casks, jobbers' prices	11¾c. to 12c. net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price	40c.
Aluminum coils, 24 ga., base price	36.70c.
Foreign	40c.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Nickel Silver Sheet Metal

10% Quality	24¼c.
15% "	25½c.
18% "	26½c.

Nickel Silver Wire and Rod

10% "	27½c.
15% "	30¾c.
18% "	33¾c.

MONEL METAL

Shot	32
Blocks	32
Hot Rolled Rods (base)	40
Cold Drawn Rods (base)	48
Hot Rolled Sheets (base)	42

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 40 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 35 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over Pig Tin. 50 to 100 lbs., 15c. over, 25 to 50 lbs., 20c. over, less than 25 lbs., 25c. over. Above prices f. o. b. mill.

SILVER SHEET

Rolled silver anodes .999 fine are quoted at from 72¼c. to 74¾c. per Troy ounce, depending upon quantity.

Rolled sterling silver 70c. to 72c.

NICKEL ANODES

85 to 87% purity	37½c.-39½c.	per lb.
90 to 92% purity	40c.-42c.	per lb.
95 to 97% purity	42c.-44c.	per lb.

Supply Prices, October 1, 1924

CHEMICALS

These are manufacturers' quality prices and based on delivery from New York City.

Acetone	lb.	.16–.17½
Acid—		
Boric (Boracic) Crystals	lb.	.12
Hydrochloric (Muriatic) Tech., 20 deg., Carboys	lb.	.02
Hydrochloric, C. P., 20 deg., Carboys	lb.	.08
Hydrofluoric, 30%, bbls	lb.	.08
Nitric, 36 deg. Carboys	lb.	.06
Nitric, 42 deg. Carboys	lb.	.07
Sulphuric, 66 deg. Carboys	lb.	.02
Alcohol—		
Butyl	lb.	.30–.35
Denatured in bbls	gal.	.50–.55
Alum—		
Lump, Barrels	lb.	.04
Powdered, Barrels	lb.	.04½
Aluminum sulphate, commercial tech	lb.	.02¾
Aluminum chloride solution in carboys	lb.	.06½
Ammonium—		
Sulphate, tech, Barrels	lb.	.03¾
Sulphocyanide	lb.	.65
Argols, white, see Cream of Tartar	lb.	.27
Arsenic, white, Kegs	lb.	.16
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate), Barrels	lb.	.05½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls.	lb.	.36
Cobalt Chloride	lb.	—
Copper—		
Acetate	lb.	.37
Carbonate, Barrels	lb.	.17
Cyanide	lb.	.50
Sulphate, Barrels	lb.	.05¼
Copperas (Iron Sulphate, bbl.)	lb.	.02
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar, Crystals (Potassium bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05–.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$75.00
Fusel Oil	gal.	$4.50
Gold Chloride	oz.	14.00
Gum—		
Sandarac	lb.	.26
Shellac	lb.	.59–.61
Iron, Sulphate, see Copperas, bbl	lb.	.02
Lead Acetate (Sugar of Lead)	lb.	.13
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	1.15
Nickel—		
Carbonate Dry	lb.	.40
Chloride, 100 lb. lots	lb.	.22¼
Salts, single bbls	lb.	.10½
Salts, double, bbl	lb.	.10
Paraffin	lb.	.05–.06
Phosphorus—Duty free, according to quantity		.35–.40
Potash, Caustic Electrolytic 88-92% fused, drums	lb.	.08¼
Potassium Bichromate, casks	lb.	.09½
Carbonate, 80-85%, casks	lb.	.05¾
Cyanide, 165 lb. cases, 94-96%	lb.	.65
Pumice, ground, bbls	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls	lb.	.03
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.08
Silver Chloride, dry	oz.	.86
Cyanide	oz.	1.07
Nitrate, 100 ounce lots	oz.	.47½
Soda Ash, 58%, bbls	lb.	.02½
Sodium—		
Biborate, see Borax (Powdered), bbls	lb.	.05½
Cyanide, 96 to 98%, 100 lbs	lb.	.22
Hyposulphite, kegs	lb.	.04
Nitrate, tech. bbls	lb.	.04¼
Phosphate, tech., bbls	lb.	.03½
Silicate (Water Glass) bbls	lb.	.02
Sulpho Cyanide	lb.	.45
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.13
Sulphur (Brimstone) bbls	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.37½
Tripoli, Powdered	lb.	.03
Verdigris, see Copper Acetate	lb.	.37
Water Glass, see Sodium Silicate, bbls	lb.	.02
Wax—		
Bees, white ref. bleached	lb.	.55
Yellow, No. 1	lb.	.35
Whiting, Bolted	lb.	.02½–.06
Zinc, Carbonate, bbls	lb.	.13–.17
Chloride, 600 lb. lots	lb.	.07
Cyanide	lb.	.41
Sulphate, bbls.	lb.	.03¼

COTTON BUFFS

Open buffs, per 100 sections (nominal).

12 inch, 20 ply, 64/68, cloth	base, 40.85
14 inch, 20 ply, 64/68, cloth	base, 50.80
12 inch, 20 ply, 84/92, cloth	base, 46.20
14 inch, 20 ply, 84/92, cloth	base, 62.25
12 inch, 20 ply, 88/96, cloth	base, 63.25
14 inch, 20 ply, 88/96, cloth	base, 85.15
Sewed Buffs, per lb., bleached and unbleached	base, .65 to .75

FELT WHEELS

		Price Per Lb. Less Than 100 Lbs.	300 Lbs. and Over
Diameter—10" to 16"	1" to 3"	2.75	2.50
" 6" 8" and over 16"	1" to 3"	2.85	2.60
" 6" to 24"	Over 3"	3.15	2.80
" 6" to 24"	½" to 1"	3.75	3.50
" 4" to 6"	¾" to 3"	4.75 }	Any quantity
" Under 4"	¼" to 3"	5.35 }	

Grey Mexican or French Grey—10c. less per lb. than Spanish, above. Odd sizes, 50c. advance.